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Industrial Source Complex (ISC) Dispersion Model User's Guide. Volume II Appendices A through I

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INDUSTRIAL SOURCE COMPLEX (ISC) DISPERSION MODEL USER'S GUIDE

VOLUME II - APPENDICES A THROUGH I

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(VOLUME II - APPENDICES A THROUGH I)

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INDUSTRIAL SOURCE COMPLEX MODEL

VOLUME II

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Comments and suggestions regarding this publication should be sent to:

Chief, Source Receptor Analysis Branch
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APPENDIX A

COMPLETE FORTRAN LISTING OF THE INDUSTRIAL SOURCE COMPLEX SHORT TERM MODEL (ISCST) COMPUTER PROGRAM

```
C*****          INDUSTRIAL SOURCE COMPLEX SHORT TERM MODEL        ******S0100010
C            WRITTEN BY CRAIG S. CHENEY, H. E. CRAMER CO., INC.         S0100020
C                                                                       S0100030
C         THIS PROGRAM IS DESIGNED TO CALCULATE GROUND-LEVEL            S0100040
C     CONCENTRATION OR DEPOSITION FROM STACK, VOLUME OR AREA SOURCES.   S0100050
C     THE RECEPTORS AT WHICH THE CONCENTRATION OR DEPOSITION ARE        S0100060
C     CALCULATED MAY BE DEFINED ON A X,Y RIGHT-HANDED CARTESIAN         S0100070
C     COORDINATE SYSTEM GRID OR A POLAR COORDINATE SYSTEM GRID.  THE    S0100080
C     POLAR COORDINATE SYSTEM DEFINES 360 DEGREES AS NORTH (POSITIVE    S0100090
C     Y-AXIS), 90 DEGREES AS EAST (POSITIVE X-AXIS), 180 DEGREES AS     S0100100
C     SOUTH AND 270 DEGREES AS WEST.  WIND DIRECTIONS ARE ALSO DEFINED  S0100110
C     IN THIS MANNER.  DISCRETE OR ARBITRARILY PLACED RECEPTORS MAY BE  S0100120
C     DEFINED USING EITHER COORDINATE SYSTEM.  FINALLY, SOURCE LOCATIONSS0100130
C     MUST BE REFERENCED WITH THE CARTESIAN COORDINATE SYSTEM.          S0100140
C                                                                       S0100150
C         AVERAGE CONCENTRATION OR TOTAL DEPOSITION MAY BE CALCULATED   S0100160
C     IN 1-, 2-, 3-, 4-, 6-, 8-, 12-  AND/OR 24-HOUR TIME               S0100170
C     PERIODS.  AN 'N'-DAY AVERAGE CONCENTRATION (OR TOTAL DEPOSITION)  S0100180
C     OR AN AVERAGE CONCENTRATION (OR TOTAL DEPOSITION) OVER THE TOTAL  S0100190
C     NUMBER OF HOURS MAY ALSO BE COMPUTED.                             S0100200
C     CONCENTRATIONS (DEPOSITIONS) MAY BE COMPUTED FOR ALL SOURCES OR   S0100210
C     FOR ANY COMBINATION OF SOURCES THE USER DESIRES.                  S0100220
C     OTHER OPTIONS INCLUDE INPUT OF TERRAIN HEIGHTS FOR RECEPTORS,     S0100230
C     TABLES OF HIGHEST AND SECOND HIGHEST CONCENTRATIONS OR            S0100240
C     DEPOSITIONS AT EACH RECEPTOR, TABLES OF THE FIFTY MAXIMUM VALUES  S0100250
C     CALCULATED AND TAPE OUTPUT.  REFER TO SECTION 3 OF THE USER'S     S0100260
C     MANUAL FOR A MORE DETAILED EXPLANATION OF THE ABOVE OPTIONS.      S0100270
C                                                                       S0100280
C         THIS PROGRAM IS WRITTEN IN FORTRAN IV AND ASSUMES A WORD      S0100290
C     LENGTH OF 32 BITS OR MORE SINCE 4 ALPHANUMERIC CHARACTERS ARE     S0100300
C     EXPECTED TO BE STORED INTO ONE WORD.  THE BASIC PROGRAM REQUIRES  S0100310
C     ABOUT 21500 WORDS OF STORAGE.  THIS PROGRAM HAS CURRENTLY LIMITED S0100320
C     DATA STORAGE TO 43500 WORDS FOR A TOTAL OF 65000 WORDS.           S0100330
C                                                                       S0100340
C     THE MAIN ROUTINE OF THIS PROGRAM DYNAMICALLY ALLOCATES STORAGE    S0100350
C     TO THE CALCULATING SUBROUTINE, MODEL.  MAXIMUM LIMITS ARE NOT     S0100360
C     LIMITED INDIVIDUALLY TO THE NUMBER OF SOURCES(NSOURC) OR THE      S0100370
C     NUMBER OF RECEPTORS(NXPNTS*NYPNTS + NXWYPT = NPNTS) OR THE        S0100380
```

```
C     NUMBER OF TIME PERIODS TO BE CALCULATED (NAVG) OR THE NUMBER OF   S0100390
C     SOURCE GROUPS DESIRED (NGROUP).  INSTEAD THE MAXIMUM LIMIT IS A   S0100400
C     FUNCTION OF ALL FOUR VARIABLES.  THIS MAXIMUM LIMIT CAN BE        S0100410
C     COMPUTED WITH THE FOLLOWING EQUATION.                             S0100420
C                                                                       S0100430
C     LIMIT = NPNTS*(2+NAVG*NGROUP) + NXPNTS + NYPNTS + 2*NXWYPT        S0100440
C           + 215*NSOURC + A + B + C                                    S0100450
C                                                                       S0100460
C     WHERE A = NPNTS*NGROUP IF ISW(15) = 1; OTHERWISE A = 0 AND        S0100470
C           B = 4*NAVG*NPNTS*NGROUP IF ISW(17) = 1; OTHERWISE B = 0 AND S0100480
C           C = 201*NAVG*NGROUP IF ISW(18) = 1; OTHERWISE C = 0.        S0100490
C     ALSO IF NGROUP = 0, ASSUME NGROUP = 1 FOR THE ABOVE EQUATION.     S0100500
C                                                                       S0100510
C     THIS LIMIT MUST NOT EXCEED THE VALUE BY WHICH THE 'QF' ARRAY      S0100520
C     IS DIMENSIONED AND BY WHICH THE VARIABLE, 'LIMIT', IS SET IN      S0100530
C     THE MAIN ROUTINE.                                                 S0100540
C                                                                       S0100550
C     THE AMOUNT OF TIME A PROBLEM RUN TAKES TO EXECUTE CAN BE DESCRIBEDS0100560
C     BY THE FOLLOWING EQUATION.                                        S0100570
C                                                                       S0100580
C     # OF MINUTES = CONSTANT*(NDAYS+1)*(1+NHOURS*[1+0.8*NSOURC         S0100590
C                    *(1+0.6*NPNTS+0.1*NGROUP*NAVG)])                   S0100600
C                                                                       S0100610
C     WHERE CONSTANT = 2.1*10**-5.  THIS VALUE IS DERIVED FROM RUNS     S0100620
C                      MADE ON A UNIVAC 1108 AND WILL VARY FOR OTHER    S0100630
C                      COMPUTERS.                                       S0100640
C           NAVG = SUM OF PARAMETERS ISW(7) TO ISW(14) SET TO 1.        S0100650
C           NPNTS = TOTAL NUMBER OF RECEPTOR POINTS.                    S0100660
C     ALL OTHER PARAMETERS ARE DEFINED IN INPUT DATA BELOW.             S0100670
C                                                                       S0100680
C                                                                       S0100690
C************************** INPUT DATA *********************************S0100700
C                                                                       S0100710
C     THE INPUT DATA IS PARTITIONED INTO SEVEN MAJOR CARD GROUPS WHERE  S0100720
C     EACH CARD GROUP CONTAINS COMMON INPUT PARAMETERS.  FOR EXAMPLE,   S0100730
C     CARD GROUP 6 CONTAINS ALL SOURCE DATA PARAMETERS.  A CARD GROUP   S0100740
C     MAY BE DIVIDED INTO 'CARDS'.  A 'CARD' MAY ACTUALLY CONSIST OF    S0100750
C     MORE THAN ONE CARD IMAGE.  A 'CARD' OR COMPLETE CARD GROUPS MAY   S0100760
```

```
C     NOT BE READ BY THE PROGRAM DEPENDING ON THE PROGRAM OPTIONS       S0100770
C     CHOSEN BY THE USER.                                               S0100780
C                                                                       S0100790
C                                                                       S0100800
C*****CARD GROUP 1                                                      S0100810
C                                                                       S0100820
C*CARD 1  FORMAT(15A4)                                                  S0100830
C                                                                       S0100840
C     TITLE - A 60 CHARACTER INFORMATION HEADING WHICH WILL APPEAR AT   S0100850
C             THE TOP OF EACH PAGE OF OUTPUT.                           S0100860
C                                                                       S0100870
C*****CARD GROUP 2                                                      S0100880
C                                                                       S0100890
C*CARD 1  FORMAT(40I2)                                                  S0100900
C                                                                       S0100910
C     ISW(1) - =1, CALCULATE CONCENTRATION,                             S0100920
C              =2, CALCULATE DEPOSITION.                                S0100930
C              IF 0 OR BLANK, 1 IS ASSUMED.                             S0100940
C     ISW(2) - =1, RECTANGULAR CARTESIAN COORDINATE RECEPTOR GRID       S0100950
C                  SYSTEM IS ASSUMED.                                   S0100960
C              =2, POLAR COORDINATE RECEPTOR GRID SYSTEM IS ASSUMED.    S0100970
C              =3, GENERATE RECTANGULAR CARTESIAN COORDINATE GRID       S0100980
C              SYSTEM.  GRIDX(1) IS THE STARTING POINT OF THE X-AXIS    S0100990
C              AND GRIDX(2) IS THE INCREMENTAL VALUE USED IN GENERATING S0101000
C              THE X-AXIS.  THE Y-AXIS IS GENERATED IN A LIKE MANNER    S0101010
C              USING GRIDY(1) AND GRIDY(2).                             S0101020
C              =4, GENERATE POLAR COORDINATE SYSTEM RADIALS.            S0101030
C              GRIDY(1) IS THE STARTING RADIAL (IN INTEGER DEGREES) AND S0101040
C              GRIDY(2) IS THE INCREMENTAL INTEGER VALUE USED TO        S0101050
C              GENERATE THE REMAINING RADIALS.  THE VALUES GENERATED    S0101060
C              MUST BE WITHIN THE RANGE OF 1 TO 360 DEGREES.            S0101070
C              IF 0 OR BLANK, 1 IS ASSUMED.                             S0101080
C     ISW(3) - =1, DISCRETE RECEPTOR POINTS ARE REFERENCED WITH THE     S0101090
C                  CARTESIAN COORDINATE SYSTEM.                         S0101100
C              =2, DISCRETE RECEPTOR POINTS ARE REFERENCED WITH THE     S0101110
C                  POLAR COORDINATE SYSTEM.                             S0101120
C              IF 0 OR BLANK, 1 IS ASSUMED.                             S0101130
C     ISW(4) - =0, NO RECEPTOR TERRAIN ELEVATIONS ARE READ.             S0101140
```

```
C              =1, RECEPTOR TERRAIN ELEVATIONS ARE READ.                S0101150
C     ISW(5) - =0, NO CONCENTRATIONS OR DEPOSITONS ARE WRITTEN TO TAPE. S0101160
C              =1, CONCENTRATIONS (DEPOSITIONS) ARE WRITTEN TO TAPE     S0101170
C              WITH LOGICAL UNIT NUMBER ITAP.  CONCENTRATIONS           S0101180
C              (DEPOSITIONS) ARE WRITTEN TO TAPE IN THE TIME PERIODS    S0101190
C              INDICATED BY ISW(7)-ISW(14).  ALSO, AN ANNUAL AVERAGE    S0101200
C              CONCENTRATION OR TOTAL DEPOSITION IS WRITTEN TO TAPE IF  S0101210
C              ISW(15) IS SET.  TWO END OF FILE MARKS ARE WRITTEN AT    S0101220
C              THE END OF THE TAPE.  CONSULT SECTION 3.2.4 OF THE USER'SS0101230
C              MANUAL FOR A DETAILED DISCUSSION OF THIS OPTION.         S0101240
C     ISW(6) - =0, NO INPUT DATA ARE LISTED.                            S0101250
C              =1, LIST ALL INPUT DATA.                                 S0101260
C              =2, LIST ALL INPUT DATA PLUS METEOROLOGICAL DATA.        S0101270
C     ISW(7) - =1, CALCULATE 1-HOUR TIME PERIODS.                       S0101280
C     ISW(8) - =1, CALCULATE 2-HOUR TIME PERIODS.                       S0101290
C     ISW(9) - =1, CALCULATE 3-HOUR TIME PERIODS.                       S0101300
C     ISW(10) - =1, CALCULATE 4-HOUR TIME PERIODS.                      S0101310
C     ISW(11) - =1, CALCULATE 6-HOUR TIME PERIODS.                      S0101320
C     ISW(12) - =1, CALCULATE 8-HOUR TIME PERIODS.                      S0101330
C     ISW(13) - =1, CALCULATE 12-HOUR TIME PERIODS.                     S0101340
C     ISW(14) - =1, CALCULATE 24-HOUR TIME PERIODS.                     S0101350
C     ISW(15) - =1, PRINT AN 'N'-DAY AVERAGE CONCENTRATION OR TOTAL     S0101360
C               DEPOSITION TABLE FOR ALL RECEPTORS AND FOR EACH SOURCE  S0101370
C               GROUP.                                                  S0101380
C     ISW(16) - =1, PRINT DAILY TABLES WHOSE TIME PERIODS ARE           S0101390
C               INDICATED BY ISW(7)-ISW(14) FOR EACH RECEPTOR FOR EACH  S0101400
C               DAY OF METEOROLOGICAL DATA AND FOR EACH SOURCE GROUP.   S0101410
C     ISW(17) - =1, PRINT TABLES OF HIGHEST AND SECOND HIGHEST          S0101420
C               CONCENTRATIONS(DEPOSITIONS) FOR EACH RECEPTOR.  A       S0101430
C               SET OF THESE TABLES IS PRINTED FOR EACH TIME PERIOD     S0101440
C               INDICATED BY ISW(7)-ISW(14) AND FOR EACH SOURCE GROUP.  S0101450
C     ISW(18) - PRINT THE MAXIMUM 50 CONCENTRATIONS (DEPOSITIONS)       S0101460
C               FOR EACH TIME PERIOD SPECIFIED BY ISW(7)-ISW(14) AND    S0101470
C               FOR EACH SOURCE GROUP.                                  S0101480
C     ISW(19) - =1, PRE-PROCESSED METEOROLOGICAL DATA IS READ ON        S0101490
C               LOGICAL UNIT IMET.                                      S0101500
C               =2, METEOROLOGICAL DATA ARE EXPECTED ON CARDS.          S0101510
C               IF 0 OR BLANK, 1 IS ASSUMED.                            S0101520
```

```
C     ISW(20) - =0, USE RURAL MODE OPTION.                              S0101530
C               =1, USE URBAN MODE 1 OPTION.                            S0101540
C               =2, USE URBAN MODE 2 OPTION.                            S0101550
C               NOTE:  IF ISW(19) = 2, THE RURAL MODE OPTION IS USED.   S0101560
C     ISW(21) - =1, THE PROGRAM PROVIDES DEFAULT VALUES FOR THE WIND    S0101570
C                   PROFILE EXPONENTS.  THESE VALUES ARE .1,.15,.2,.25, S0101580
C                   .3,.3 FOR EACH OF THE SIX STABILITY CATEGORIES AND  S0101590
C                   FOR ALL WIND SPEED CATEGORIES.                      S0101600
C               =2, ENTER WIND PROFILE EXPONENTS IN CARD GROUP 5, CARDS S0101610
C                   1-6.  THESE VALUES ARE USED THROUGHOUT THE DATA     S0101620
C                   CASE.  SEE CARD GROUP 5.                            S0101630
C               =3, THE PROGRAM READS ALL WIND PROFILE EXPONENTS ON AN  S0101640
C                   HOUR-TO-HOUR BASIS IN CARD GROUP 7.  SEE CARD GROUP S0101650
C                   7.  NOTE THAT THIS OPTION IS APPLICABLE ONLY IF     S0101660
C                   HOURLY METEOROLOGICAL DATA IS CARD INPUT (ISW(19)   S0101670
C                   EQUALS 2).                                          S0101680
C               DEFAULT VALUE EQUALS 1.                                 S0101690
C     ISW(22) - =1, THE PROGRAM PROVIDES DEFAULT VALUES FOR THE VERTICALS0101700
C                   POTENTIAL TEMPERATURE GRADIENTS.  THESE VALUES ARE  S0101710
C                   0.0,0.0,0.0,0.0,0.02,0.035 FOR EACH OF THE SIX      S0101720
C                   STABILITY CATEGORIES AND FOR ALL WIND SPEED         S0101730
C                   CATEGORIES.                                         S0101740
C               =2, ENTER VERTICAL POTENTIAL TEMPERATURE GRADIENTS IN   S0101750
C                   CARD GROUP 5, CARDS 7-12.  THE VALUES ARE USED      S0101760
C                   THROUGHOUT THE DATA CASE.  SEE CARD GROUP 5.        S0101770
C               =3, THE PROGRAM READS ALL VERTICAL POTENTIAL TEMPERATURES0101780
C                   GRADIENTS ON AN HOUR-TO-HOUR BASIS IN CARD GROUP 7. S0101790
C                   SEE CARD GROUP 7.  NOTE THAT THIS OPTION IS         S0101800
C                   APPLICABLE ONLY IF HOURLY METEOROLOGICAL DATA IS    S0101810
C                   CARD INPUT (ISW(19) EQUALS 2).                      S0101820
C               DEFAULT VALUE EQUALS 1.                                 S0101830
C     ISW(23) - THIS PARAMETER ALLOWS THE SCALING OF SOURCE EMISSION    S0101840
C               RATES AS A FUNCTION OF SEASON, MONTH, HOUR OF THE DAY   S0101850
C               WIND SPEED AND STABILITY, OR A COMBINATION OF BOTH      S0101860
C               SEASONAL AND HOUR OF THE DAY VARIANCE.  IF THIS PARA-   S0101870
C               METER IS GREATER THAN ZERO THEN THE SOURCE EMISSION     S0101880
C               RATES (Q) FOR ALL SOURCES ARE ADJUSTED DEPENDING ON     S0101890
C               WHICH OPTION IS CHOSEN.  ALSO, THE USE OF THIS PARAMETERS0101900
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C        OVERRIDES THE INPUT PARAMETER QFLG (SEE CARD GROUP 6).    S0101910
C        OTHERWISE IF ISW(23) EQUALS ZERO THEN THE SOURCE          S0101920
C        EMISSION RATES FOR A GIVEN SOURCE MAY BE SCALED USING     S0101930
C        THE CORRESPONDING QFLG PARAMETER FOR THAT SOURCE.  SET    S0101940
C        ISW(23) TO THE VALUE ACCORDING TO THE LIST OF OPTIONS     S0101950
C        BELOW.  THESE SAME OPTIONS ARE USED BY THE QFLG PARA-     S0101960
C        METER FOR EACH SOURCE.  THE SCALING FACTOR VALUES ARE     S0101970
C        ENTERED IN CARD GROUP 6, CARD 5 AND IN A FORMAT           S0101980
C        DEPENDING ON WHICH OPTION IS SELECTED FROM ISW(23) (OR    S0101990
C        QFLG).                                                    S0102000
C        =0, NO SCALING OF THE SOURCE EMISSION RATES FOR ALL       S0102010
C            SOURCES IS PERFORMED (EQUIVALENT TO MULTIPLYING       S0102020
C            SOURCE STRENGTH, Q, BY 1.0).  SCALING OF INDIVIDUAL S0102030
C            SOURCE EMISSION RATES OF SOURCES MAY STILL BE         S0102040
C            EXERCISED BY THE INPUT PARAMETER QFLG (SEE CARD       S0102050
C            GROUP 6).                                             S0102060
C        =1, SCALE SOURCE EMISSION RATES ACCORDING TO SEASON.      S0102070
C            INPUT FOUR SCALARS IN CARD GROUP 6, CARD 5 FOR THE    S0102080
C            WINTER, SPRING, SUMMER AND AUTUMN SEASONS.  A SEASONS0102090
C            IS DETERMINED FROM THE JULIAN DAY OF A 366-DAY YEAR.S0102100
C            WINTER INCLUDES JULIAN DAYS 336-60, SPRING 61-152,    S0102110
C            SUMMER 153-244 AND AUTUMN 245-335.  THESE JULIAN      S0102120
C            DAYS, FOR EACH SEASON, CORRESPOND WITH THE 3 MONTHS S0102130
C            OF EACH METEOROLOGICAL SEASON.                        S0102140
C        =2, SCALE SOURCE EMISSION RATES ACCORDING TO MONTH.       S0102150
C            INPUT TWELVE SCALARS IN CARD GROUP 6, CARD 5 FOR      S0102160
C            EACH MONTH OF THE YEAR BEGINNING WITH JANUARY AND     S0102170
C            PROCEEDING THROUGH THE YEAR TO DECEMBER.  A MONTH ISS0102180
C            DETERMINED FROM THE JULIAN DAY OF A 366-DAY YEAR.     S0102190
C        =3, SCALE SOURCE EMISSION RATES BY HOUR OF THE DAY.       S0102200
C            INPUT 24 SCALARS IN CARD GROUP 6, CARD 5 BEGINNING    S0102210
C            WITH HOUR 1 FOR EACH HOUR OF THE DAY.                 S0102220
C        =4, SCALE SOURCE EMISSION RATES DEPENDING ON BOTH THE     S0102230
C            WIND SPEED AND STABILITY CATEGORY VALUES FOR A GIVENS0102240
C            HOUR OF METEOROLOGICAL DATA.  INPUT SIX SETS OF SIX S0102250
C            SCALARS FOR EACH OF THE SIX STABILITY CATEGORIES      S0102260
C            (A-F) BEGINNING WITH STABILITY CATEGORY A(=1).  FOR S0102270
C            EACH OF THE SIX SETS, SIX SCALARS ARE ENTERED FOR     S0102280
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C                          EACH WIND SPEED CATEGORY BEGINNING WITH THE LOWEST  S0102290
C                          WIND SPEED CATEGORY.  HENCE, A TOTAL OF 36 SCALARS  S0102300
C                          ARE ENTERED IN CARD GROUP 6, CARD 5.                S0102310
C                      =5, SCALE SOURCE EMISSION RATES DEPENDING ON BOTH SEASONS0102320
C                          AND HOUR OF THE DAY.  INPUT FOUR SETS OF 24 SCALARS S0102330
C                          FOR EACH OF THE FOUR SEASONS BEGINNING WITH WINTER  S0102340
C                          AND FOLLOWED BY SPRING, SUMMER AND AUTUMN.  A TOTAL S0102350
C                          OF 96 SCALARS ARE ENTERED IN CARD GROUP 6, CARD 5.  S0102360
C         ISW(24) - =1, PPOGRAM USES FINAL PLUME RISE AT ALL RECEPTOR LOCA-  S0102370
C                          TIONS.  RECEPTOR LOCATION IS NOT A FUNCTION OF THE  S0102380
C                          PLUME RISE WITH THIS OPTION.                        S0102390
C                      =2, PROGRAM COMPUTES PLUME RISE AS A FUNCTION OF THE    S0102400
C                          DOWNWIND DISTANCE (RECEPTOR LOCATION).              S0102410
C                      DEFAULT VALUE EQUALS 1.                                 S0102420
C         ISW(25) - =1, DO NOT MODIFY THE PHYSICAL STACK HEIGHT TO ACCOUNT  S0102430
C                          FOR DOWNWASH.                                       S0102440
C                      =2, MODIFY THE PHYSICAL STACK HEIGHT FOR ALL STACKS TO  S0102450
C                          ACCOUNT FOR STACK DOWNWASH ACCORDING TO             S0102460
C                          BRIGGS, 1973.                                       S0102470
C                      DEFAULT VALUE EQUALS 1.                                 S0102480
C                                                                              S0102490
C*CARD 2  FORMAT(8I6)                                                          S0102500
C                                                                              S0102510
C         NSOURC - NUMBER OF SOURCES                                           S0102520
C         NXPNTS - NUMBER OF X POINTS IN THE X-AXIS FOR A CARTESIAN            S0102530
C                  COORDINATE RECEPTOR GRID OR THE NUMBER OF RANGES (RINGS)    S0102540
C                  FOR A POLAR COORDINATE RECEPTOR GRID.                       S0102550
C         NYPNTS - NUMBER OF Y POINTS IN THE Y-AXIS FOR A CARTESIAN            S0102560
C                  COORDINATE RECEPTOR GRID OR THE NUMBER OF DIRECTIONS        S0102570
C                  (RADIALS) FOR A POLAR COORDINATE GRID.                      S0102580
C         NXWYPT - NUMBER OF DISCRETE OR ARBITRARILY PLACED RECEPTORS.         S0102590
C         NGROUP - NUMBER OF SOURCE GROUPS.  EACH SOURCE GROUP IS A            S0102600
C                  SELECTED NUMBER OF SOURCES SPECIFIED BY THE USER (SEE       S0102610
C                  DATA CARD GROUP 4) FROM THE NUMBER OF SOURCES               S0102620
C                  PROCESSED IN THE PROBLEM RUN.  THE CONCENTRATION OR         S0102630
C                  DEPOSITION CONTRIBUTED COLLECTIVELY BY THE SOURCES          S0102640
C                  IN EACH SOURCE GROUP IS COMPUTED AND PRINTED DEPENDING      S0102650
C                  ON THE OPTIONS SELECTED IN DATA CARD GROUP 2, CARD 1.       S0102660
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C                IF LEFT BLANK OR ZERO, THE PROGRAM WILL SUM OVER ALL      S0102670
C                SOURCES.  MAXIMUM EQUALS 150 SOURCE GROUPS.               S0102680
C          IPERD - THIS PARAMETER ALLOWS THE USER TO SPECIFY AN N-TH TIME  S0102690
C               PERIOD FOR WHICH CONCENTRATIONS OR DEPOSITIONS ARE         S0102700
C               PRINTED.  THIS PARAMETER IS USED IN CONJUNCTION WITH THE   S0102710
C               ISW(7) - ISW(14) OPTIONS.  FOR EXAMPLE, IF ONE DESIRES TO  S0102720
C               SEE THE FIFTH 3-HOUR PERIOD OF AVERAGE CONCENTRATION (OR   S0102730
C               TOTAL DEPOSITION) THEN IPERD IS SET TO 5 AND ISW(8) IS SETS0102740
C               TO 1.  ALSO, ANY INVALID COMBINATIONS OF IPERD AND THE     S0102750
C               TIME PERIOD ISW OPTIONS ARE IGNORED.  EXAMPLES OF THESE    S0102760
C               ARE A FIFTH 24-HOUR TIME PERIOD OR A FOURTH 8-HOUR TIME    S0102770
C               PERIOD.                                                    S0102780
C                                                                          S0102790
C       NOTE:  THE FOLLOWING 2 INPUT PARAMETERS ARE USED ONLY IF           S0102800
C              METEOROLOGICAL DATA ARE CARD INPUT (ISW(19)=2).             S0102810
C       NHOURS - NUMBER OF HOURS PER DAY OF METEOROLOGICAL DATA.           S0102820
C       NDAYS  - NUMBER OF DAYS OF METEOROLOGICAL DATA.                    S0102830
C                IF 0 OR BLANK, NDAYS IS SET TO 1.                         S0102840
C                                                                          S0102850
C*****CARD GROUP 3                                                         S0102860
C                                                                          S0102870
C*CARD 1  FORMAT(8F10.0) THIS CARD IS NOT READ IF NXPNTS OR NYPNTS = 0.    S0102880
C                                                                          S0102890
C      GRIDX - IF ISW(2)=1, X-AXIS RECEPTOR ARRAY IN METERS.               S0102900
C              IF ISW(2) = 2 OR 4, RECEPTOR RANGE(RING) ARRAY IN METERS.   S0102910
C              IF ISW(2)=3, GRIDX(1) IS THE STARTING LOCATION FOR THE      S0102920
C              X-AXIS IN METERS AND GRIDX(2) IS THE INCREMENT AT WHICH     S0102930
C              THE X-AXIS IS GENERATED IN METERS.                          S0102940
C                                                                          S0102950
C*CARD 2  FORMAT(8F10.0) THIS CARD IS NOT READ IF NXPNTS OR NYPNTS = 0.    S0102960
C                                                                          S0102970
C      GRIDY - IF ISW(2)=1, Y-AXIS RECEPTOR ARRAY IN METERS.               S0102980
C              IS ISW(2)=2, RECEPTOR DIRECTION(RADIAL) ARRAY IN INTEGER    S0102990
C              DEGREE VALUES WITHIN THE RANGE OF 1 TO 360 DEGREES.         S0103000
C              DEFAULT VALUE = 360 DEGREES.                                S0103010
C              IF ISW(2)=3, GRIDY(1) IS THE STARTING LOCATION FOR THE      S0103020
C              Y-AXIS IN METERS AND GRIDY(2) IS THE INCREMENT AT WHICH     S0103030
C              THE Y-AXIS IS GENERATED IN METERS.                          S0103040
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C             IF ISW(2)=4, GRIDY(1) IS THE STARTING DIRECTION(RADIAL)  S0103050
C             IN INTEGER DEGREES AND GRIDY(2) IS THE INTEGER INCREMENT S0103060
C             AT WHICH THE RADIALS ARE GENERATED IN DEGREES.  THE       S0103070
C             VALUES GENERATED MUST BE WITHIN THE RANGE OF 1 TO 360     S0103080
C             DEGREES.                                                  S0103090
C             DEFAULT VALUE = 360 DEGREES.                              S0103100
C                                                                       S0103110
C*CARD 3  FORMAT(8F10.0) THIS CARD IS NOT READ IF NXWYPT = 0.           S0103120
C                                                                       S0103130
C     XDIS - IF ISW(3)=1, ARRAY OF X VALUES IN METERS FOR DISCRETE      S0103140
C            RECEPTORS.                                                 S0103150
C            IF ISW(3)=2, ARRAY OF RANGES IN METERS FOR DISCRETE        S0103160
C            RECEPTORS.                                                 S0103170
C                                                                       S0103180
C*CARD 4  FORMAT(8F10.0) THIS CARD IS NOT READ IF NXWYPT = 0.           S0103190
C                                                                       S0103200
C     YDIS - IF ISW(3)=1, ARRAY OF Y VALUES IN METERS FOR DISCRETE      S0103210
C            RECEPTORS.                                                 S0103220
C            IF ISW(3)=2, ARRAY OF DIRECTIONS(RADIALS) IN INTEGER       S0103230
C            DEGREE VALUES FOR DISCRETE RECEPTORS.  VALUES MUST BE      S0103240
C            WITHIN 1 TO 360 DEGREES.                                   S0103250
C            DEFAULT VALUE = 360 DEGREES.                               S0103260
C                                                                       S0103270
C*CARD 5  FORMAT(8F10.0) THIS CARD IS READ ONLY IF ISW(4) = 1.          S0103280
C                                                                       S0103290
C     GRIDZ - ARRAY OF TERRAIN ELEVATIONS FOR RECEPTORS IN FEET         S0103300
C             FOR EACH Y-AXIS (OR RADIALS) AN X-AXIS (OR RANGE) ARRAY   S0103310
C             IS READ.  FOR EACH X-AXIS ARRAY READ, A NEW CARD IMAGE IS S0103320
C             STARTED.  THE ELEVATIONS FOR ANY DISCRETE RECEPTORS ARE   S0103330
C             THEN READ STARTING WITH A NEW CARD IMAGE.                 S0103340
C                                                                       S0103350
C*****CARD GROUP 4  THIS CARD GROUP IS NOT READ IF NGROUP = 0.          S0103360
C                                                                       S0103370
C*CARD 1  FORMAT(20I4)                                                  S0103380
C                                                                       S0103390
C     NSOGRP - AN ARRAY OF INTEGERS INDICATING HOW MANY SOURCE NUMBERS  S0103400
C              ARE TO BE READ FOR EACH SOURCE GROUP.  THE SOURCE NUMBERSS0103410
C              ARE READ IN THE ARRAY IDSOR.  SEE CARD 2 BELOW FOR AN    S0103420
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C              EXAMPLE OF THIS PARAMETER'S USE AND FOR THE EXPLANATION  S0103430
C              OF THE PARAMETER IDSOR WHICH IS USED IN CONJUNCTION WITH S0103440
C              NSOGRP.  A MAXIMUM OF 150 VALUES MAY BE INPUT.           S0103450
C                                                                       S0103460
C*CARD 2  FORMAT(13I6)                                                  S0103470
C                                                                       S0103480
C      IDSOR - AN INTEGER ARRAY CONTAINING THE SOURCE NUMBERS OR, THE   S0103490
C              LOWER AND UPPER BOUND OF SOURCE NUMBERS TO BE SUMMED     S0103500
C              TOGETHER.  THIS PARAMETER IS USED IN CONJUNCTION WITH    S0103510
C              THE ARRAY NSOGRP IN CARD 1 ABOVE.  THE FOLLOWING EXAMPLE S0103520
C              SHOULD ILLUSTRATE THE USE OF THE PARAMETERS NGROUP (SEE  S0103530
C              DATA CARD GROUP 2), NSOGRP AND IDSOR.  LET US ASSUME THAT S0103540
C              WE HAVE 50 SOURCES WHOSE NUMBERS ARE 10,20,30,...,490,500.S0103550
C              FIRST, IF THE USER DESIRES TO SEE THE CONCENTRATION (OR  S0103560
C              DEPOSITION) FROM ALL SOURCES IN THE PROBLEM RUN, NAMELY, S0103570
C              THE 50 MENTIONED ABOVE THEN SET NGROUP TO 0.  THE        S0103580
C              PARAMETERS NSOGRP AND IDSOR WOULD NOT BE INPUT.  INSTEAD S0103590
C              LET US SUPPOSE THAT WE DESIRE TO SEE THE CONCENTRATION   S0103600
C              (OR DEPOSITION) INDIVIDUALLY FROM SOURCES 10, 100, 200,  S0103610
C              300, 400 AND 500.  WE ALSO WISH TO SEE THE COMBINED      S0103620
C              CONTRIBUTION FROM SOURCES 10 THROUGH 100; 50 THROUGH 260; S0103630
C              100 THROUGH 200 PLUS 400 THROUGH 500; AND FINALLY ALL    S0103640
C              SOURCES 10 THROUGH 500.  HENCE, THE CONCENTRATION (OR    S0103650
C              (DEPOSITION) CONTRIBUTIONS FROM SIX INDIVIDUAL SOURCES   S0103660
C              ARE DESIRED PLUS THE CONTRIBUTION FROM FOUR SETS OF      S0103670
C              COMBINED SOURCES ARE DESIRED FOR A TOTAL OF TEN SOURCE   S0103680
C              GROUPS.  THUS, ENTER THE VALUE 10 FOR NGROUP.  FOR NSOGRP S0103690
C              ONE WOULD ENTER 1,1,1,1,1,1,2,2,4,2.  FOR THE IDSOR ARRAY S0103700
C              ONE WOULD ENTER 10,100,200,300,400,500,10,-100,50,-260,  S0103710
C              100,-200,400,-500,10,-500.  THE FIRST SIX ENTRIES OF BOTH S0103720
C              NSOGRP AND IDSOR ARE IN A ONE-TO-ONE CORRESPONDENCE; THE S0103730
C              1 ENTERED IN NSOGRP IMPLIES THAT ONLY ONE SOURCE NUMBER  S0103740
C              NEED BE READ IN THE IDSOR ARRAY FOR A COMPLETE SOURCE    S0103750
C              GROUP CONTRIBUTION.  THE SEVENTH ENTRY IN NSOGRP, A 2,   S0103760
C              INDICATES THAT THE SOURCE NUMBERS 10 AND -100 ARE TO BE  S0103770
C              CONSIDERED FOR A SOURCE GROUP WHILE THE MINUS SIGN       S0103780
C              INDICATES INCLUSIVE SUMMING FROM SOURCES 10 TO 100.  ONE S0103790
C              NEED NOT BE CONCERNED BY THE FACT THAT NO SOURCE NUMBER  S0103800
C             OF, SAY, '43' EXISTS.  THE PROGRAM ONLY SUMS OVER THOSE   S0103810
C             SOURCES DEFINED, NAMELY IN THIS CASE 10,20,30,...,90,100. S0103820
C             LIKEWISE, ENTRY EIGHT IN NSOGRP, A 2, CALLS FOR A SOURCE  S0103830
C             GROUP INCLUDING SOURCES 50 THROUGH 260.  IF ONE DESIRES   S0103840
C             SOURCE CONTRIBUTIONS FROM SOURCES BUT NOT FROM SOURCES    S0103850
C             BETWEEN, THE NINTH ENTRY IN NSOGRP, A 4, ILLUSTRATES      S0103860
C             THIS PROCEDURE.  THE FOUR IMPLIES THAT FOUR SOURCE NUMBERSS0103870
C             NEED BE READ IN ORDER TO DEFINE A SOURCE GROUP.  IN THIS  S0103880
C             CASE THE FOUR SOURCE NUMBERS READ ARE 100,-200,400,-500   S0103890
C             IMPLYING THAT THE INCLUSIVE SUMMATION OVER SOURCES 100    S0103900
C             TO 200 AND 400 TO 500 ARE DESIRED EXCLUDING SOURCE        S0103910
C             NUMBERS 210 THROUGH 390.  FINALLY, IT IS STILL POSSIBLE   S0103920
C             TO OBTAIN THE COMBINED CONTRIBUTION FROM ALL SOURCES IN   S0103930
C             THE PROBLEM RUN AS SHOWN IN THE LAST SOURCE GROUP.        S0103940
C             IN SUMMARY; 1) NGROUP IS A VALUE USED TO REPRESENT THE    S0103950
C             NUMBER OF SOURCE GROUPS DESIRED; 2) THE VALUES IN NSOGRP  S0103960
C             INDICATE THE NUMBER OF SOURCE NUMBERS TO BE READ IN IDSOR;S0103970
C             AND 3) IDSOR CONTAINS THE SOURCE NUMBERS USED TO          S0103980
C             CONSTITUTE A SOURCE GROUP WHERE A MINUS SIGN IMPLIES      S0103990
C             INCLUSIVE SUMMING FROM THE PREVIOUS SOURCE NUMBER ENTERED S0104000
C             TO THE SOURCE NUMBER WITH THE MINUS SIGN.                 S0104010
C             THE NUMBER OF VALUES CAN NOT EXCEED 200 IN THE IDSOR      S0104020
C             ARRAY.                                                    S0104030
C                                                                       S0104040
C*****CARD GROUP 5                                                      S0104050
C                                                                       S0104060
C*CARDS 1-6  FORMAT(6F10.0)  THESE CARDS ARE READ ONLY IF ISW(21) IN    S0104070
C                            CARD GROUP 2 EQUALS 1.                     S0104080
C                                                                       S0104090
C     PDEF - ENTER WIND PROFILE EXPONENTS FOR SIX STABILITY CATEGORIES  S0104100
C            (A-F) AND SIX WIND SPEED CATEGORIES (ENTERED IN UCATS IN   S0104110
C            CARD 13 BELOW).  FOR EACH STABILITY CATEGORY, BEGINNING    S0104120
C            WITH STABILITY CATEGORY A, ENTER SIX WIND PROFILE EXPONENTSS0104130
C            FOR EACH WIND SPEED CATEGORY ON ONE CARD.  A TOTAL OF SIX  S0104140
C            CARDS ARE READ FOR A TOTAL OF 36 VALUES.                   S0104150
C                                                                       S0104160
C*CARDS 7-12  FORMAT(6F10.0)  THESE CARDS ARE READ ONLY IF ISW(22) IN   S0104170
C                             CARD GROUP 2 EQUALS 1.                    S0104180
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C                                                                 S0104190
C     DTHDEF - ENTER VERTICAL POTENTIAL TEMPERATURE GRADIENTS (DEGREES  S0104200
C              KELVIN/METER) FOR SIX STABILITY CATEGORIES (A-F) AND     S0104210
C              SIX WIND SPEED CATEGORIES (ENTERED IN UCATS IN DATA CARD S0104220
C              13 BELOW).  FOR EACH STABILITY CATEGORY, BEGINNING WITH  S0104230
C              STABILITY CATEGORY A, ENTER SIX GRADIENT VALUES ON ONE   S0104240
C              CARD.  A TOTAL OF SIX CARDS ARE READ FOR A TOTAL OF 36   S0104250
C              VALUES.                                                  S0104260
C                                                                 S0104270
C*CARD 13  FORMAT(6F10.0)                                          S0104280
C                                                                 S0104290
C     ZR - HEIGHT AT WHICH THE WIND SPEED WAS MEASURED (METERS).        S0104300
C          DEFAULT ASSUMES 10.0 METERS.                                 S0104310
C     UCATS - INPUT THE UPPER BOUND OF THE FIRST THROUGH FIFTH WIND     S0104320
C             SPEED CATEGORIES IN METERS PER SECOND.  DEFAULT VALUES    S0104330
C             EQUAL 1.54, 3.09, 5.14, 8.23, 10.80 RESPECTIVELY.         S0104340
C                                                                 S0104350
C*CARD 14  FORMAT(E8.0,3F8.0,3A4,7A4,2I2)                          S0104360
C                                                                 S0104370
C     TK - SOURCE EMISSION RATE UNITS CONVERSION FACTOR.  IF 0 OR BLANK,S0104380
C          TK IS SET TO 10**6 FOR CONCENTRATION AND 1.0 FOR DEPOSITION. S0104390
C     BETA1 - ADIABATIC ENTRAINMENT COEFFICIENT FOR PLUME RISE. IF 0    S0104400
C             OR BLANK BETA1 IS SET TO 0.6.                             S0104410
C     BETA2 - STABLE ENTRAINMENT COEFFICIENT FOR PLUME RISE. IF 0 OR    S0104420
C             BLANK BETA2 IS SET TO 0.6.                                S0104430
C     DECAY - WASHOUT COEFFICIENT FOR PRECIPITATION SCAVENGING.  IF 0   S0104440
C             OR BLANK, NO SCAVENGING IS ASSUMED.  THE VALUE ENTERED    S0104450
C             FOR THIS PARAMETER IS IGNORED BY THE PROGRAM IF CARD      S0104460
C             METEOROLOGICAL DATA ARE INPUT (ISW(19)=2).                S0104470
C     IQUN - 12 CHARACTERS IDENTIFYING EMISSION RATE (Q) UNITS.  IF     S0104480
C            BLANK, EMISSION RATE IS ASSUMED IN (GRAM/SEC) FOR          S0104490
C            CONCENTRATION AND (GRAMS) FOR DEPOSITION.                  S0104500
C     ICHIUN - 28 CHARACTERS IDENTIFYING OUTPUT UNITS.  IF BLANK, OUTPUTS0104510
C              FOR CONCENTRATION IS (MICROGRAMS/CUBIC METER) AND FOR    S0104520
C              DEPOSITION IS (GRAMS/SQUARE METER).                      S0104530
C     IMET - LOGICAL UNIT NUMBER OF METEOROLOGICAL DATA.  DEFAULT VALUE S0104540
C            EQUALS 9 FOR PREPROCESSED DATA (ISW(19)=1), AND EQUALS 5   S0104550
C            (CURRENT VALUE OF INTERNAL VARIABLE 'IN') FOR CARD DATA    S0104560
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C            (ISW(19)=2).                                                S0104570
C      ITAP - LOGICAL UNIT NUMBER OF TAPE OUTPUT OPTION.  IF 0 OR BLANK, S0104580
C             ITAP IS SET TO 3.                                          S0104590
C                                                                        S0104600
C*CARDS 15-19  FORMAT(80I1)  THESE CARDS ARE READ ONLY IF PRE-PROCESSED S0104610
C                            METEOROLOGICAL DATA ARE USED (ISW(19)=1).   S0104620
C                                                                        S0104630
C      IDAY - ARRAY OF 366 INDICATING WHICH DAYS OF METEOROLOGY ARE TO   S0104640
C             BE USED BY THE PROGRAM.  FOR EXAMPLE, IF DAY(140)=1 THEN   S0104650
C             DAY 140 WILL BE USED ALONG WITH ANY OTHER VALUES SET TO 1. S0104660
C                                                                        S0104670
C*CARD 20  FORMAT(4I6)  THIS CARD IS READ ONLY IF PRE-PROCESSED          S0104680
C                       METEOROLOGICAL DATA ARE USED (ISW(19)=1).        S0104690
C                                                                        S0104700
C      ISS - SURFACE STATION NUMBER TO BE MATCHED WITH NUMBER READ FROM  S0104710
C            METEOROLOGICAL DATA.                                        S0104720
C      ISY - YEAR OF SURFACE DATA, A TWO DIGIT INTEGER.                  S0104730
C      IUS - UPPER AIR STATION NUMBER TO BE MATCHED WITH NUMBER READ     S0104740
C            FROM METEOROLOGICAL DATA.                                   S0104750
C      IUY - YEAR OF UPPER AIR DATA, A TWO DIGIT NUMBER.                 S0104760
C                                                                        S0104770
C*****CARD GROUP 6                                                       S0104780
C                                                                        S0104790
C*CARD 1  FORMAT(I5,2I1,I2,I1,F8.0,2F7.0,8F6.0)  THIS CARD IS REPEATED   S0104800
C                                                'NSOURC' TIMES.         S0104810
C                                                                        S0104820
C      NSO - SOURCE IDENTIFICATION NUMBER.  MUST BE A POSITIVE NUMBER.   S0104830
C      ITYPE - =0, STACK TYPE SOURCE.                                    S0104840
C              =1, VOLUME TYPE SOURCE.                                   S0104850
C              =2, AREA TYPE SOURCE.                                     S0104860
C      WAKE - STACK WAKE EFFECTS OPTION FOR CHOOSING WHICH SIGMA Y       S0104870
C             EQUATION TO USE.                                           S0104880
C             =0, 'UPPER BOUND' CONCENTRATION IS CALCULATED.             S0104890
C             =1, 'LOWER BOUND' CONCENTRATION IS CALCULATED.             S0104900
C             DEFAULT ASSUMES 0.                                         S0104910
C             REFER TO SECTION 2.4.1.D OF THE USER'S GUIDE FOR A MORE    S0104920
C             COMPLETE DISCUSSION OF THIS OPTION.                        S0104930
C      NVS - NUMBER OF GRAVITATIONAL SETTLING CATEGORIES.  MAXIMUM OF    S0104940
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C           20.  IF > 0, CARDS 2-4 BELOW ARE READ IMMEDIATELY FOLLOWINGS0104950
C           THIS SOURCE INPUT CARD.                                     S0104960
C     QFLG - THIS PARAMETER ALLOWS THE SCALING OF THE SOURCE EMISSION  S0104970
C            RATE FOR THIS SOURCE AS A FUNCTION OF SEASON, MONTH, HOUR  S0104980
C            OF THE DAY, WIND SPEED AND STABILITY, OR A COMBINATION OF S0104990
C            BOTH SEASONAL AND HOUR OF THE DAY VARIANCE.  IF THE PARA- S0105000
C            METER ISW(23) IN CARD GROUP 2 IS GREATER THAN 0 THEN THIS S0105010
C            PARAMETER IS IGNORED.  IF ISW(23) = 0, QFLG MAY BE USED INS0105020
C            AN ANALOGOUS MANNER TO ISW(23) EXCEPT ONLY THE SOURCE FOR S0105030
C            WHICH QFLG > 0 IS AFFECTED.  ALL VALID VALUES FOR ISW(23) S0105040
C            APPLY FOR THIS PARAMETER (QFLG).  THE SOURCE EMISSION     S0105050
C            RATE SCALARS ARE ENTERED IN CARD 5 BELOW.                  S0105060
C         Q - SOURCE EMISSION RATE.                                     S0105070
C         FOR CONCENTRATION AND TYPE 0 & 1 SOURCES,                     S0105080
C         UNITS ARE IN MASS PER UNIT TIME, TYPE 2 SOURCE UNITS ARE IN   S0105090
C         MASS PER UNIT TIME PER UNIT AREA.  FOR DEPOSITION AND TYPE    S0105100
C         0 & 1 SOURCES, UNITS ARE IN MASS, TYPE 2 SOURCE UNITS ARE     S0105110
C         IN MASS PER UNIT AREA.                                        S0105120
C     XS - X LOCATION OF SOURCE IN METERS.                              S0105130
C     YS - Y LOCATION OF SOURCE IN METERS.                              S0105140
C     ZS - ELEVATION OF SOURCE AT SOURCE BASE IN METERS.                S0105150
C     HS - HEIGHT OF SOURCE ABOVE GROUND IN METERS.                     S0105160
C     TS - FOR TYPE 0 SOURCES, STACK EXIT TEMPERATURE IN DEGREES KELVIN.S0105170
C          FOR TYPE 1 SOURCES, INITIAL VERTICAL DIMENSION IN METERS.    S0105180
C     VS - FOR TYPE 0 SOURCES, STACK EXIT VELOCITY IN METERS PER SECOND.S0105190
C          FOR TYPE 1 SOURCES, INITIAL HORIZONTAL DIMENSION IN METERS.  S0105200
C          FOR TYPE 2 SOURCES, WIDTH OF SOURCE IN METERS.               S0105210
C     NOTE:  THE FOLLOWING FOUR INPUT PARAMETERS ARE FOR STACK-TYPE     S0105220
C            SOURCES ONLY.                                              S0105230
C         D - STACK INNER DIAMETER IN METERS.                           S0105240
C     HB - HEIGHT OF BUILDING ADJACENT TO STACK IN METERS.              S0105250
C     HL - LENGTH OF BUILDING ADJACENT TO STACK IN METERS.              S0105260
C     HW - WIDTH OF BUILDING ADJACENT TO STACK IN METERS.               S0105270
C                                                                       S0105280
C*CARDS 2-4  FORMAT(8F10.0)  THESE CARDS ARE READ ONLY IF THE PARAMETER S0105290
C                            NVS IN CARD 1 ABOVE IS > 0 FOR A GIVEN     S0105300
C                            SOURCE.  IF SO, THESE CARDS ARE READ       S0105310
C                            IMMEDIATELY FOLLOWING THE SOURCE CARD      S0105320
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C                            (CARD 1) ON WHICH THE PARAMETER NVS > 0.  S0105330
C                                                                       S0105340
C     PHI - ARRAY CONTAINING THE MASS FRACTION OF PARTICULATES FOR ALL  S0105350
C           SETTLING CATEGORIES.  MAXIMUM OF 20 VALUES.                 S0105360
C     VSN - ARRAY CONTAINING THE GRAVITATIONAL SETTLING VELOCITY FOR    S0105370
C           PARTICULATES FOR ALL SETTLING CATEGORIES.  MAXIMUM OF 20    S0105380
C           VALUES.                                                     S0105390
C     GAMMA - ARRAY CONTAINING THE SURFACE REFLECTION COEFFICIENT FOR   S0105400
C             PARTICULATES FOR ALL SETTLING CATEGORIES.  MAXIMUM OF     S0105410
C             20 VALUES.                                                S0105420
C                                                                       S0105430
C*CARD 5  FORMAT(8F10.0)  THIS CARD IS READ ONCE ONLY IF ISW(23) IN DATAS0105440
C                         CARD GROUP 2 > 0.  IF ISW(23) = 0, THIS CARD  S0105450
C                         IS REPEATED FOR EACH SOURCE WHERE QFLG > 0 AS S0105460
C                         INDICATED IN CARD 1 ABOVE.  IF ISW(23) = 0 ANDS0105470
C                         QFLG = 0 FOR ALL SOURCES, THIS CARD IS NOT    S0105480
C                         READ.                                         S0105490
C                                                                       S0105500
C     QTK - ENTER SOURCE EMISSION RATE SCALARS IN A FORMAT DEPENDING    S0105510
C           ON THE VALUE OF ISW(23) (OR QFLG).  THE FORMAT IS THOROUGHLYS0105520
C           DISCUSSED IN THE DESCRIPTION OF PARAMETER ISW(23) IN CARD   S0105530
C           GROUP 2.  THE FOLLOWING IS A SUMMARY OF THE AFOREMENTIONED  S0105540
C           FORMAT.  IF ISW(23) (OR QFLG) = 1, ENTER 4 SEASONAL SCALARS S0105550
C           ON ONE CARD; = 2, ENTER 12 MONTHLY SCALARS.  TWO CARDS ARE  S0105560
C           READ; =3, ENTER 24 HOURLY SCALARS.  THREE CARDS ARE READ;   S0105570
C           = 4, ENTER 6 SCALARS FOR EACH WIND SPEED CATEGORY PER CARD  S0105580
C           FOR EACH OF THE SIX STABILITY CATEGORIES.  SIX CARDS ARE    S0105590
C           READ FOR A TOTAL OF 36 SCALARS; = 5, ENTER FOUR SETS OF 24  S0105600
C           HOURLY SCALARS.  EACH SET REPRESENTS ONE SEASON OF SCALARS. S0105610
C           A TOTAL OF 12 CARDS ARE READ FOR A TOTAL OF 96 VALUES.      S0105620
C                                                                       S0105630
C*****CARD GROUP 7  FORMAT(I8,5F8.0,I8,2F8.0)                           S0105640
C                   THIS CARD GROUP IS READ ONLY IF CARD METEOROLOGICAL S0105650
C                   DATA ARE ENTERED (ISW(19)=2).  THIS CARD GROUP      S0105660
C                   CONSISTS OF 'NHOURS' CARDS.  THIS CARD GROUP IS     S0105670
C                   REPEATED 'NDAYS' TIMES.                             S0105680
C                                                                       S0105690
C     JDAY - JULIAN DAY OF METEOROLOGICAL DATA.  THIS IS USED TO        S0105700
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C            COMPUTE SEASON OR MONTH FOR ANY SOURCES WHICH HAVE         S0105710
C            VARIATIONAL EMISSION RATES.  THE PROGRAM USES THE JDAY     S0105720
C            VALUE READ FOR THE FIRST HOUR OF EACH DAY.  THE SECOND     S0105730
C            AND SUCCESSIVE HOURS FOR EACH DAY ARE IGNORED.  DEFAULT    S0105740
C            VALUE = 1.                                                 S0105750
C     AFV - WIND FLOW VECTOR. DIRECTION IN DEGREES TO WHICH THE WIND    S0105760
C           IS FLOWING.                                                 S0105770
C     AWS - WIND SPEED IN METERS PER SECOND AT REFERENCE HEIGHT 'ZR'.   S0105780
C     HLH - HEIGHT OF SURFACE MIXING LAYER IN METERS.                   S0105790
C     TEMP - AMBIENT AIR TEMPERATURE IN DEGREES KELVIN.                 S0105800
C     DTHDZ - VERTICAL POTENTIAL TEMPERATURE GRADIENT IN DEGREES KELVIN S0105810
C             PER METER.                                                S0105820
C             THIS VALUE IS READ ONLY IF ISW(22) EQUALS 3.              S0105830
C     IST - PASQUILL STABILITY CATEGORY.  A=1, B=2, C=3, ETC.           S0105840
C     P - WIND PROFILE EXPONENT.                                        S0105850
C         THIS VALUE IS READ ONLY IF ISW(21) EQUALS 3.                  S0105860
C     DECAY - DECAY COEFFICIENT.  THE VALUE OF THIS PARAMETER OVERRIDES S0105870
C             THE PARAMETER DECAY IN CARD GROUP 5.                      S0105880
C                                                                       S0105890
C***********************************************************************S0105900
C                                                                       S0105910
C                                                                       S0105920
C     THIS IS THE MAIN PROGRAM OF THE EPA INDUSTRIAL SOURCE COMPLEX     S0105930
C     SHORT TERM MODEL.  THIS ROUTINE'S PURPOSE IS TO CALCULATE THE     S0105940
C     AMOUNT OF STORAGE REQUIRED FOR TABLES, RECEPTOR GRID AND SOURCE   S0105950
C     INFORMATION.  IN ORDER FOR THESE CALCULATIONS TO BE MADE THE 'ISW'S0105960
C     ARRAY, THE VARIABLES WHICH DETERMINE THE NUMBER OF RECEPTORS AND  S0105970
C     THE NUMBER OF SOURCES ARE READ.                                   S0105980
C                                                                       S0105990
      INTEGER TITLE                                                     S0106000
      COMMON QF(43500)                                                  S0106010
      DIMENSION IZERO(161),IQF(1)                                       S0106020
      COMMON /LOGIX/ ISW(40),NSOURC,NXPNTS,NYPNTS,NXWYPT,NGROUP,        S0106030
     1 NSOGRP(150),IDSOR(200),IPERD,NPNTS,NAVG,NHOURS,NDAYS,NTDAY,LINE, S0106040
     2 IO,IN,TITLE(15),IQUN(3),ICHIUN(7),CONDEP(6),LIMIT,I13            S0106050
      EQUIVALENCE (ISW,IZERO),(QF,IQF)                                  S0106060
C     SET MAXIMUM LIMIT FOR 'QF' ARRAY.  MUST AGREE WITH VALUE USED TO  S0106070
C     DIMENSION 'QF'.                                                   S0106080
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      LIMIT = 43500                                                     S0106090
C     CLEAR 'QF' ARRAY AND 'LOGIX' BLOCK.                               S0106100
      DO 10  I = 1,LIMIT                                                S0106110
   10 QF(I) = 0.0                                                       S0106120
      DO 20  I = 1,161                                                  S0106130
   20 IZERO(I) = 0                                                      S0106140
C     SET INPUT AND OUTPUT LOGICAL UNIT NUMBERS.                        S0106150
      IN = 5                                                            S0106160
      IO = 6                                                            S0106170
C     INPUT TITLE.                                                      S0106180
      READ(IN,9001) (TITLE(I),I=1,15)                                   S0106190
C     INPUT LOGIC OPTIONS.                                              S0106200
      READ(IN,9002) (ISW(I),I=1,40)                                     S0106210
C     INPUT SOURCE & RECEPTOR SIZE VALUES.                              S0106220
      READ(IN,9003) NSOURC,NXPNTS,NYPNTS,NXWYPT,NGROUP,IPERD,NHOURS,    S0106230
     1 NDAYS                                                            S0106240
C     DETERMINE NUMBER OF TIME PERIODS TO BE CALCULATED.                S0106250
      NAVG = 0                                                          S0106260
      DO 30  I = 7,14                                                   S0106270
      IF (ISW(I) .LE. 0) GOTO 30                                        S0106280
      NAVG = NAVG + 1                                                   S0106290
   30 CONTINUE                                                          S0106300
C     CALCULATE TOTAL NUMBER OF RECEPTORS.                              S0106310
      NPNTS = NXPNTS*NYPNTS + NXWYPT                                    S0106320
      NGROPS = NGROUP                                                   S0106330
      IF(NGROUP .LE. 0) NGROPS = 1                                      S0106340
      NN = NAVG*NPNTS*NGROPS                                            S0106350
C     CALCULATE INDICES FOR STORAGE ALLOCATION.                         S0106360
      I1 = NPNTS + NPNTS + 1                                            S0106370
      I2 = I1 + NN                                                      S0106380
      I3 = I2                                                           S0106390
      IF(ISW(15) .EQ. 1) I3 = I2 + NPNTS*NGROPS                         S0106400
      I4 = I3                                                           S0106410
      I5 = I3                                                           S0106420
      IF(NXPNTS .EQ. 0 .OR. NYPNTS .EQ. 0) GOTO 40                      S0106430
      I4 = I3 + NXPNTS                                                  S0106440
      I5 = I4 + NYPNTS                                                  S0106450
   40 I6 = I5                                                           S0106460
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      I7 = I5                                                           S0106470
      IF(NXWYPT .EQ. 0) GOTO 50                                         S0106480
      I6 = I5 + NXWYPT                                                  S0106490
      I7 = I6 + NXWYPT                                                  S0106500
   50 I8 = I7                                                           S0106510
      IF(ISW(4) .NE. 0) I8 = I7 + NPNTS                                 S0106520
      I9 = I8                                                           S0106530
      IF(ISW(17) .NE. 0) I9 = I8 + 4*NN                                 S0106540
      I10 = I9                                                          S0106550
      I11 = I10                                                         S0106560
      I12 = I10                                                         S0106570
      IF(ISW(18) .LE. 0) GOTO 60                                        S0106580
      I10 = I9 + 150*NAVG*NGROPS                                        S0106590
      I11 = I10 + 50*NAVG*NGROPS                                        S0106600
      I12 = I11 + NAVG*NGROPS                                           S0106610
   60 I13 = I12 + 215*NSOURC - 1                                        S0106620
C     DETERMINE IF CALCULATED STORAGE ALLOCATION EXCEEDS LIMIT.         S0106630
      IF(I13 .LE. LIMIT) GOTO 70                                        S0106640
      WRITE(IO,9004) I13,LIMIT                                          S0106650
      STOP                                                              S0106660
C     CALL INPUT ROUTINE.                                               S0106670
   70 CALL INCHK(QF(1),QF(I1),QF(I2),QF(I3),QF(I4),QF(I5),QF(I6),QF(I7),S0106680
     1 QF(I8),QF(I9),IQF(I10),IQF(I11),QF(I12))                         S0106690
C     CALL MODEL ROUTINE.                                               S0106700
      CALL MODEL(QF(1),QF(I1),QF(I2),QF(I3),QF(I4),QF(I5),QF(I6),QF(I7),S0106710
     1 QF(I8),QF(I9),IQF(I10),IQF(I11),QF(I12))                         S0106720
      STOP                                                              S0106730
 9001 FORMAT(15A4)                                                      S0106740
 9002 FORMAT(40I2)                                                      S0106750
 9003 FORMAT(13I6)                                                      S0106760
 9004 FORMAT(59H1   ***ERROR***  CALCULATED STORAGE ALLOCATION LIMIT EQUS0106770
     1ALS,I6,/52H AND EXCEEDS THE MAXIMUM STORAGE ALLOCATION LIMIT OF,I6S0106780
     2,/16H RUN TERMINATED.)                                            S0106790
      END                                                               S0106800
      SUBROUTINE INCHK(CALC,CHIAV,CHIAN,GRIDX,GRIDY,XDIS,YDIS,GRIDZ,    S0200010
     1 CHIMAX,CHI50,IPNT,ICOUNT,SOURCE)                                 S0200020
C     THIS ROUTINE READS THE REST OF THE INPUT VARIABLES AND PROVIDES   S0200030
C     DEFAULT VALUES IF REQUIRED.  ALSO TABLES LISTING THE INPUT VARI-  S0200040
C     ABLES ARE CONTROLLED BY THIS ROUTINE.                             S0200050
C                                                                       S0200060
      LOGICAL DONE                                                      S0200070
      INTEGER TITLE,WAKE,QFLG,QFLGS                                     S0200080
      COMMON /LOGIX/ ISW(40),NSOURC,NXPNTS,NYPNTS,NXWYPT,NGROUP,        S0200090
     1 NSOGRP(150),IDSOR(200),IPERD,NPNTS,NAVG,NHOURS,NDAYS,NTDAY,LINE, S0200100
     2 IO,IN,TITLE(15),IQUN(3),ICHIUN(7),CONDEP(6),LIMIT,MIMIT          S0200110
      COMMON /MET/ IDAY(366),ISTAB(24),AWS(24),TEMP(24),AFV(24),        S0200120
     1 AFVR(24),HLH(24,2),P(24),DTHDZ(24),DECAY(24),PDEF(6,6),          S0200130
     2 DTHDEF(6,6),GAM1I,GAM2I,ZR,DDECAY,IMET,ITAP,TK,UCATS(5)          S0200140
      DIMENSION GRIDX(1),GRIDY(1),XDIS(1),YDIS(1),GRIDZ(1),SOURCE(215,1)S0200150
      DIMENSION METER(2),SEASON(2,4),ATHRUF(6),UCTDEF(5)                S0200160
      EQUIVALENCE (ISW(23),QFLGS)                                       S0200170
      DATA ATHRUF / 1HA,1HB,1HC,1HD,1HE,1HF /                           S0200180
      DATA UCTDEF / 1.54,3.09,5.14,8.23,10.8 /                          S0200190
      DATA METER /4H(MET,4HERS)/                                        S0200200
      DATA SEASON /4HWINT,4HER  ,4HSPRI,4HNG  ,4HSUMM,4HER  ,4HAUTU,    S0200210
     1 4HMN  /                                                          S0200220
      DATA IBLANK /4H    /                                              S0200230
C     CHECK 'ISW' AND SET DEFAULT VALUES.                               S0200240
C     DEFAULT TO CONCENTRATION ON RECTANGULAR GRID & DISCRETE POINTS.   S0200250
   10 IF(ISW(1) .LE. 0) ISW(1) = 1                                      S0200260
      IF(ISW(2) .LE. 0) ISW(2) = 1                                      S0200270
      IF(ISW(3) .LE. 0) ISW(3) = 1                                      S0200280
C     DEFAULT CARD MET PARAMETERS.                                      S0200290
      IF(NDAYS .LE. 0) NDAYS = 1                                        S0200300
C     DEFAULT TO PRE-PROCESSED MET DATA WITH RURAL OPTION.              S0200310
      IF(ISW(19) .LE. 0) ISW(19) = 1                                    S0200320
      IF(ISW(19) .EQ. 2) ISW(20) = 0                                    S0200330
C     DEFAULT TO PROGRAM'S WIND PROFILE EXPONENT AND VERTICAL POTENTIAL S0200340
C     TEMPERATURE GRADIENT VALUES.                                      S0200350
      IF(ISW(21) .LT. 1) ISW(21) = 1                                    S0200360
      IF(ISW(22) .LT. 1) ISW(22) = 1                                    S0200370
C     DEFAULT TO FINAL PLUME RISE FOR ALL RECEPTORS.                    S0200380
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      IF(ISW(24) .LT. 1) ISW(24) = 1                                    S0200390
C     DEFAULT TO NO STACK DOWNWASH ADJUSTMENT.                          S0200400
      IF(ISW(25) .LT. 1) ISW(25) = 1                                    S0200410
C     READ GRID THEN DISCRETE POINTS                                    S0200420
      IF(NXPNTS .EQ. 0 .OR. NYPNTS .EQ. 0) GOTO 70                      S0200430
      IF(ISW(2) .NE. 3) READ(IN,9020) (GRIDX(I),I=1,NXPNTS)             S0200440
      IF(ISW(2) .LT. 3) READ(IN,9020) (GRIDY(I),I=1,NYPNTS)             S0200450
      IF(ISW(2) .NE. 3) GOTO 30                                         S0200460
C     GENERATE GRID, THEN READ DISCRETE POINTS.                         S0200470
      READ(IN,9020) GRIDX(1),DX                                         S0200480
      I2 = NXPNTS - 1                                                   S0200490
      DO 20  I = 1,I2                                                   S0200500
      I1 = I + 1                                                        S0200510
   20 GRIDX(I1) = GRIDX(I) + DX                                         S0200520
   30 IF(ISW(2) .LT. 3) GOTO 50                                         S0200530
      READ(IN,9020) GRIDY(1),DY                                         S0200540
      I2 = NYPNTS - 1                                                   S0200550
      DO 40  I = 1,I2                                                   S0200560
      I1 = I + 1                                                        S0200570
   40 GRIDY(I1) = GRIDY(I) + DY                                         S0200580
   50 IF(ISW(2) .NE. 2 .AND. ISW(2) .NE. 4) GOTO 70                     S0200590
C     SET DEFAULT DIRECTION VALUES.                                     S0200600
      DO 60 I = 1,NYPNTS                                                S0200610
   60 IF(GRIDY(I) .LE. 0.0 .OR. GRIDY(I) .GT. 360.0) GRIDY(I) = 360.0   S0200620
   70 IF(NXWYPT .EQ. 0) GOTO 90                                         S0200630
      READ(IN,9020) (XDIS(I),I=1,NXWYPT)                                S0200640
      READ(IN,9020) (YDIS(I),I=1,NXWYPT)                                S0200650
      IF(ISW(3) .NE. 2) GOTO 90                                         S0200660
C     SET DEFAULT DIRECTION VALUES.                                     S0200670
      DO 80 I = 1,NXWYPT                                                S0200680
   80 IF(YDIS(1) .LE. 0.0 .OR. YDIS(I) .GT. 360.0) YDIS(I) = 360.0      S0200690
C     CHECK FOR TERRAIN HEIGHTS                                         S0200700
   90 IF(ISW(4) .NE. 1) GOTO 125                                        S0200710
      IF(NXPNTS .EQ. 0 .OR. NYPNTS .EQ. 0) GOTO 110                     S0200720
C     READ TERRAIN FOR GRID  AND DISCRETE REC'S; READ NO OF SOURCE GROUPS S0200730
      DO 100  J = 1,NYPNTS                                              S0200740
      I1 = (J-1)*NXPNTS                                                 S0200750
      I2 = I1 + NXPNTS                                                  S0200760
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            I1 = I1 + 1                                                 S0200770
  100 READ(IN,9020) (GRIDZ(I),I=I1,I2)                                  S0200780
  110 IF(NXWYPT .EQ. 0) GOTO 120                                        S0200790
      I1 = NXPNTS*NYPNTS + 1                                            S0200800
      READ(IN,9020) (GRIDZ(I),I=I1,NPNTS)                               S0200810
  120 DO 121 I=1,NPNTS                                                  S0200820
  121 GRIDZ(I) = GRIDZ(I) * .3048006                                    S0200830
  125 IF(NGROUP .EQ. 0) GOTO 140                                        S0200840
      READ(IN,9023) (NSOGRP(I),I=1,NGROUP)                              S0200850
      I1 = 0                                                            S0200860
      DO 130 I = 1,NGROUP                                               S0200870
  130 I1 = I1 + NSOGRP(I)                                               S0200880
      READ(IN,9024) (IDSOR(I),I=1,I1)                                   S0200890
C     DEFAULT OR READ WIND PROFILE EXPONENTS, VERTICAL POTENTIAL        S0200900
C     TEMPERATURE GRADIENTS.                                            S0200910
  140 IF(ISW(21) .NE. 2) GOTO 160                                       S0200920
      DO 150  J = 1,6                                                   S0200930
  150 READ(IN,9020)  (PDEF(I,J),I=1,6)                                  S0200940
  160 IF(ISW(22) .NE. 2) GOTO 180                                       S0200950
      DO 170  J = 1,6                                                   S0200960
  170 READ(IN,9020)  (DTHDEF(I,J),I=1,6)                                S0200970
C     ENTER QFLGS AND WIND SPEED CATEGORIES.                            S0200980
  180 READ(IN,9020) ZR,(UCATS(I),I=1,5)                                 S0200990
      DO 190   I = 1,5                                                  S0201000
      IF(UCATS(I) .GT. 0.0) GOTO 190                                    S0201010
      UCATS(I) = UCTD[illegible](I)                                     S0201020
  190 CONTINUE                                                          S0201030
C     READ GENERAL INPUT VARIABLES & SET DEFAULT VALUES.                S0201040
  200 READ(IN,9021) TK,BETA1,BETA2,DDECAY,(IQUN(I),I=1,3),              S0201050
     1 (ICHIUN(I),I=1,7),IMET,ITAP                                      S0201060
      IF(TK .LE. 0.0 .AND. ISW(1) .EQ. 1) TK = 1.E6                     S0201070
      IF(TK .LE. 0.0 .AND. ISW(1) .EQ. 2) TK = 1.0                      S0201080
      IF(BETA1 .LE. 0.0) BETA1 = .6                                     S0201090
      IF(BETA2 .LE. 0.0) BETA2 = .6                                     S0201100
      IF(IMET .LE. 0 .AND. ISW(19) .EQ. 1) IMET = 9                     S0201110
      IF(IMET .LE. 0 .AND. ISW(19) .EQ. 2) IMET = IN                    S0201120
      IF(ITAP .LE. 0) ITAP = 3                                          S0201130
      IF(ZR .LE. 0.0) ZR = 10.0                                         S0201140
      DO 210 I = 1,3                                                    S0201150
      IF(IQUN(I) .NE. IBLANK) GOTO 230                                  S0201160
  210 CONTINUE                                                          S0201170
      IF(ISW(1) .EQ. 2) GOTO 220                                        S0201180
      IQUN(1) = 4H(GRA                                                  S0201190
      IQUN(2) = 4HMS/S                                                  S0201200
      IQUN(3) = 4HEC)                                                   S0201210
      GOTO 230                                                          S0201220
  220 IQUN(1) = 4H  (G                                                  S0201230
      IQUN(2) = 4HRAMS                                                  S0201240
      IQUN(3) = 4H)                                                     S0201250
  230 DO 240 I = 1,7                                                    S0201260
      IF(ICHIUN(I) .NE. IBLANK) GOTO 260                                S0201270
  240 CONTINUE                                                          S0201280
      IF(ISW(1) .EQ. 2) GOTO 250                                        S0201290
      ICHIUN(1) = 4H(MIC                                                S0201300
      ICHIUN(2) = 4HROGR                                                S0201310
      ICHIUN(3) = 4HAMS/                                                S0201320
      ICHIUN(4) = 4HCUBI                                                S0201330
      ICHIUN(5) = 4HC ME                                                S0201340
      ICHIUN(6) = 4HTER)                                                S0201350
      ICHIUN(7) = 4H                                                    S0201360
      GOTO 260                                                          S0201370
  250 ICHIUN(1) = 4H(GRA                                                S0201380
      ICHIUN(2) = 4HMS/S                                                S0201390
      ICHIUN(3) = 4HQUAR                                                S0201400
      ICHIUN(4) = 4HE ME                                                S0201410
      ICHIUN(5) = 4HTER                                                 S0201420
      ICHIUN(6) = 4H                                                    S0201430
      ICHIUN(7) = 4H                                                    S0201440
C     READ 'DAY' ARRAY & MET IDENTIFICATION.                            S0201450
  260 IF(ISW(19) .NE. 1) GOTO 270                                       S0201460
      READ(IN,9022) (IDAY(I),I=1,366)                                   S0201470
      READ(IN,9024) ISS,ISY,IUS,IUY                                     S0201480
      NDAYS = 365                                                       S0201490
      IF(MOD(ISY,4) .EQ. 0) NDAYS = 366                                 S0201500
      READ(IMET) ISSI,ISYI,IUSI,IUYI                                    S0201510
      IF(ISS.EQ.ISSI.AND.ISY.EQ.ISYI.AND.IUS.EQ.IUSI.AND.IUY.EQ.IUYI)   S0201520
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    1 GOTO 280                                                          S0201530
      WRITE(IO,9025) ISS,ISSI,ISY,ISYI,IUS,IUSI,IUY,IUYI                S0201540
      STOP                                                              S0201550
C     FOR CARD MET DATA SET RURAL-URBAN SWITCH TO RURAL.                S0201560
  270 ISW(20) = 0                                                       S0201570
  280 IF(NSOURC .GT. 0) GOTO 290                                        S0201580
      WRITE(IO,9026)                                                    S0201590
      STOP                                                              S0201600
C*                                                                      S0201610
C     READ SOURCE DATA.                                                 S0201620
C     MOST VARIABLES ARE READ DIRECTLY INTO THE 'SOURCE' ARRAY WHICH    S0201630
C     HAS 215 STORAGE LOCATIONS ALLOCATED PER SOURCE.  STORAGE LOCATION S0201640
C     1 CONTAINS WAKE, QLFG, NVS & ITYPE PACKED INTO THE FIRST LOCATION.S0201650
C     STORAGE LOCATIONS 2-13 CONTAIN:  NSO, Q, X, Y, ZS, HS, TS OR      S0201660
C     SIGZO, VS OR SIGYO OR XO, D, HB, BUILDING LENGTH, AND BUILDING    S0201670
C     WIDTH, RESPECTIVELY.  STORAGE LOCATIONS 16-35 CONTAIN PHI, 36-55  S0201680
C     CONTAIN SETTLING VELOCITIES AND 56-75 CONTAIN GAMMA.  STORAGE     S0201690
C     LOCATIONS 76-81 CONTAIN STABILITY-DEPENDENT LATERAL VIRTUAL       S0201700
C     DISTANCES AND LOCATIONS 82-117 CONTAIN STABILITY AND XBAR-        S0201710
C     DEPENDENT VERTICAL VIRTUAL DISTANCES BOTH OF WHICH ARE COMPUTED   S0201720
C     IN SUBROUTINE MODEL.  STORAGE LOCATIONS 120-215 CONTAIN Q         S0201730
C     ADJUSTMENT FACTORS AS A FUNCTION OF EITHER TIME OF DAY-SEASONAL ORS0201740
C     STABILITY-WIND SPEED VARIATIONS.  STORAGE LOCATIONS 14, 15, 118, &S0201750
C     119 ARE CURRENTLY NOT BEING USED.                                 S0201760
C                                                                       S0201770
  290 II = 1                                                            S0201780
  300 IF(II .GT. NSOURC) GOTO 320                                       S0201790
      READ(IN,9027) NSO,ITYPE,WAKE,NVS,QFLG,(SOURCE(I,II),I=3,13)       S0201800
      IF(NVS .LE. 0) GOTO 310                                           S0201810
C     INPUT VARIABLES RELATED TO PARTICULATE SOURCES.                   S0201820
      READ(IN,9020) (SOURCE(15+I,II),I=1,NVS)                           S0201830
      READ(IN,9020) (SOURCE(35+I,II),I=1,NVS)                           S0201840
      READ(IN,9020) (SOURCE(55+I,II),I=1,NVS)                           S0201850
  310 CONTINUE                                                          S0201860
C     PACK SOURCE VARIABLES WAKE, QFLG, NVS & ITYPE INTO FIRST LOCATION.S0201870
C     ALSO STORE SOURCE NUMBER.                                         S0201880
      SOURCE(1,II) = ITYPE + NVS*16 + QFLG*512 + WAKE*8192              S0201890
      SOURCE(2,II) = NSO                                                S0201900
      II = II + 1                                                       S0201910
      GOTO 300                                                          S0201920
C     ENTER SOURCE EMISSION RATE SCALARS.                               S0201930
  320 II = 1                                                            S0201940
      IF(QFLGS .LT. 1 .OR. QFLGS .GT. 5) GOTO 330                       S0201950
      DONE = .TRUE.                                                     S0201960
      QFLG = QFLGS                                                      S0201970
      GOTO 350                                                          S0201980
  330 DONE = .FALSE.                                                    S0201990
  340 IF(II .GT. NSOURC) GOTO 430                                       S0202000
      ITYPE = SOURCE(1,II)                                              S0202010
      QFLG = ITYPE/512 - (ITYPE/8192)*16                                S0202020
      IF(QFLG .LT. 1 .OR. QFLG .GT. 5) GOTO 420                         S0202030
  350 J = 1                                                             S0202040
      I = 4                                                             S0202050
      GOTO (400,360,370,380,390), QFLG                                  S0202060
  360 I = 12                                                            S0202070
      GOTO 400                                                          S0202080
  370 I = 24                                                            S0202090
      GOTO 400                                                          S0202100
  380 J = 6                                                             S0202110
      I = 6                                                             S0202120
      GOTO 400                                                          S0202130
  390 J = 4                                                             S0202140
      I = 24                                                            S0202150
  400 DO 410 II = 1,J                                                   S0202160
      IFR = (II-1)*I + 120                                              S0202170
      ITO = IFR + I - 1                                                 S0202180
  410 READ(IN,9020) (SOURCE(I2,II),I2=IFR,ITO)                          S0202190
      IF(DONE) GOTO 430                                                 S0202200
  420 II = II + 1                                                       S0202210
      GOTO 340                                                          S0202220
C     LIST ALL INPUT VARIABLES IF DESIRED.                              S0202230
  430 IF(ISW(6) .LE. 0) GOTO 820                                        S0202240
      WRITE(IO,9029) (TITLE(I),I=1,15)                                  S0202250
      WRITE(IO,9030) (ISW(I),I=1,14)                                    S0202260
      WRITE(IO,9031) (ISW(I),I=15,25)                                   S0202270
      WRITE(IO,9032) NSOURC,NGROUP,IPERD,NXPNTS,NYPNTS,NXWYPT           S0202280
      IF(ISW(19) .EQ. 2) WRITE(IO,9033) NHOURS,NDAYS                    S0202290
      WRITE(IO,9034) TK,BETA1,BETA2,ZR,IMET                             S0202300
      IF(ISW(19) .NE. 1) GOTO 440                                       S0202310
      WRITE(IO,9035) DDECAY,ISS,ISY,IUS,IUY                             S0202320
  440 CONTINUE                                                          S0202330
      IF(ISW(5) .GT. 0) WRITE(IO,9036) ITAP                             S0202340
      WRITE(IO,9056) LIMIT,MINIT                                        S0202350
      WRITE(IO,9029) (TITLE(I),I=1,15)                                  S0202360
      LINE = 6                                                          S0202370
      IF(ISW(19) .NE. 1) GOTO 450                                       S0202380
C     PRINT 'DAY' ARRAY.                                                S0202390
      LINE = 18                                                         S0202400
      WRITE(IO,9037) (IDAY(I),I=1,366)                                  S0202410
  450 IF(NGROUP .EQ. 0) GOTO 470                                        S0202420
C     PRINT SOURCE GROUP INFO.                                          S0202430
      LINE = LINE + 12                                                  S0202440
      WRITE(IO,9057) (NSOGRP(I),I=1,NGROUP)                             S0202450
      I3 = 0                                                            S0202460
      DO 460 I = 1,NGROUP                                               S0202470
  460 I3 = I3 + NSOGRP(I)                                               S0202480
      WRITE(IO,9058) (IDSOR(I),I=1,I3)                                  S0202490
C     PRINT UPPER BOUND OF FIRST 5 WIND SPEED CATEGORIES.               S0202500
  470 LINE = LINE + 6                                                   S0202510
      WRITE(IO,9001) (UCATS(I),I=1,5)                                   S0202520
      IF(ISW(19).EQ.2.AND.ISW(6).EQ.2) GOTO 530                         S0202530
      IF(ISW(21) .EQ. 3) GOTO 500                                       S0202540
C     PRINT WIND PROFILE EXPONENTS.                                     S0202550
      LINE = LINE + 12                                                  S0202560
      IF(LINE .LT. 57) GOTO 480                                         S0202570
      LINE = 15                                                         S0202580
      WRITE(IO,9029) TITLE                                              S0202590
  480 WRITE(IO,9059)                                                    S0202600
      WRITE(IO,9016) (I1,I1=1,6)                                        S0202610
      DO 490  I = 1,6                                                   S0202620
  490 WRITE(IO,9017) ATHRUF(I),(PDEF(J,I),J=1,6)                        S0202630
  500 IF(ISW(22) .EQ. 3) GOTO 530                                       S0202640
C     PRINT VERTICAL POTENTIAL TEMPERATURE GRADIENTS.                   S0202650
      LINE = LINE + 12                                                  S0202660
      IF(LINE .LT. 57) GOTO 510                                         S0202670
      LINE = 15                                                         S0202680
      WRITE(IO,9029) TITLE                                              S0202690
  510 WRITE(IO,9060)                                                    S0202700
      WRITE(IO,9016) (I1,I1=1,6)                                        S0202710
      DO 520  I = 1,6                                                   S0202720
  520 WRITE(IO,9017) ATHRUF(I),(DTHDEF(J,I),J=1,6)                      S0202730
C     PRINT RECEPTOR INFO.                                              S0202740
  530 IF(NXPNTS .EQ. 0 .OR. NYPNTS .EQ. 0) GOTO 550                     S0202750
      LINE = LINE + 20                                                  S0202760
      IF(LINE .LT. 57) GOTO 540                                         S0202770
      LINE = 6                                                          S0202780
      WRITE(IO,9029) TITLE                                              S0202790
  540 IF(ISW(2) .EQ. 1 .OR. ISW(2) .EQ. 3) WRITE(IO,9038)               S0202800
      IF(ISW(2) .EQ. 2 .OR. ISW(2) .EQ. 4) WRITE(IO,9039)               S0202810
      WRITE(IO,9040) (GRIDX(I),I=1,NXPNTS)                              S0202820
      IF(ISW(2) .EQ. 1 .OR. ISW(2) .EQ. 3) WRITE(IO,9041)               S0202830
      IF(ISW(2) .EQ. 2 .OR. ISW(2) .EQ. 4) WRITE(IO,9042)               S0202840
      WRITE(IO,9040) (GRIDY(I),I=1,NYPNTS)                              S0202850
  550 IF(NXWYPT .EQ. 0) GOTO 570                                        S0202860
      LINE = LINE + 5 + NXWYPT/5                                        S0202870
      IF(LINE .LT. 57) GOTO 560                                         S0202880
      LINE = 6                                                          S0202890
      WRITE(IO,9029) TITLE                                              S0202900
  560 IF(ISW(3) .EQ. 1) WRITE(IO,9043)                                  S0202910
      IF(ISW(3) .EQ. 2) WRITE(IO,9044)                                  S0202920
      WRITE(IO,9045) (XDIS(I),YDIS(I),I=1,NXWYPT)                       S0202930
C     PRINT TERRAIN HEIGHTS.                                            S0202940
  570 IF(ISW(4) .NE. 1) GOTO 580                                        S0202950
      CONDEP(3) = 4HHGT                                                 S0202960
      CALL DYOUT(GRIDX,GRIDY,XDIS,YDIS,GRIDZ,99,IDY,IHR,1,0,0,0)        S0202970
C     PRINT OUT SOURCE INFO.                                            S0202980
  580 CONTINUE                                                          S0202990
      LINE = 100                                                        S0203000
      I3 = 0                                                            S0203010
      DO 600 I = 1,NSOURC                                               S0203020
      IF(LINE .LE. 56) GOTO 590                                         S0203030
      WRITE(IO,9029) (TITLE(J),J=1,15)                                  S0203040
      WRITE(IO,9046) ((IQUN(J),J=1,3),I2=1,2),(METER(1),METER(2),J=1,10)S0203050
      LINE = 18                                                         S0203060
  590 CONTINUE                                                          S0203070
      ITYPE = SOURCE(1,I)                                               S0203080
C     GET WAKE OPTION, SOURCE NO., NVS & TYPE FROM FIRST WORD.          S0203090
      NSO = SOURCE(2,I)                                                 S0203100
      WAKE = ITYPE/8192                                                 S0203110
      QFLG = ITYPE/512 - (ITYPE/8192)*16                                S0203120
      NVS = ITYPE/16 - (ITYPE/512)*32                                   S0203130
      ITYPE = ITYPE - (ITYPE/16)*16                                     S0203140
      IF(NVS .GT. 0) I3 = 1                                             S0203150
      WRITE(IO,9047) NSO,ITYPE,WAKE,NVS,(SOURCE(J,I),J=3,13)            S0203160
      LINE = LINE + 1                                                   S0203170
  600 CONTINUE                                                          S0203180
      IF(I3 .NE. 1) GOTO 630                                            S0203190
C     PRINT OUT PARTICLE CATEGORY INFORMATION.                          S0203200
      LINE = 100                                                        S0203210
      DO 620 I = 1,NSOURC                                               S0203220
      IF(LINE .LT. 43) GOTO 610                                         S0203230
      WRITE(IO,9029) (TITLE(J),J=1,15)                                  S0203240
      WRITE(IO,9049)                                                    S0203250
      LINE = 10                                                         S0203260
  610 CONTINUE                                                          S0203270
      ITYPE = SOURCE(1,I)                                               S0203280
      NSO = SOURCE(2,I)                                                 S0203290
      NVS = ITYPE/16 - (ITYPE/512)*32                                   S0203300
      IF(NVS .LE. 0) GOTO 620                                           S0203310
      WRITE(IO,9050) NSO                                                S0203320
      I2 = 15 + NVS                                                     S0203330
      WRITE(IO,9051)  (SOURCE(J,I),J=16,I2)                             S0203340
      I2 = 35 + NVS                                                     S0203350
      WRITE(IO,9052)  (SOURCE(J,I),J=36,I2)                             S0203360
      I2 = 55 + NVS                                                     S0203370
      WRITE(IO,9053) (SOURCE(J,I),J=56,I2)                              S0203380
      LINE = LINE + 14                                                  S0203390
  620 CONTINUE                                                          S0203400
C     PRINT SOURCE EMISSION RATE SCALARS.                               S0203410
  630 I = 1                                                             S0203420
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      IF(QFLGS .LT. 1 .OR. QFLGS .GT. 5) GOTO 640                      S0203430
      DONE = .TRUE.                                                    S0203440
      QFLG = QFLGS                                                     S0203450
      LINE = 100                                                       S0203460
      GOTO 670                                                         S0203470
  640 DONE = .FALSE.                                                   S0203480
      J = 1                                                            S0203490
  650 IF(J .GT. 5) GOTO 820                                            S0203500
      LINE = 100                                                       S0203510
      I = 1                                                            S0203520
  660 IF(I .GT. NSOURC) GOTO 810                                       S0203530
      ITYPE = SOURCE(1,I)                                              S0203540
      QFLG = ITYPE/512 - (ITYPE/8192)*16                               S0203550
      IF(QFLG .NE. J) GOTO 800                                         S0203560
      NSO = SOURCE(2,I)                                                S0203570
  670 GOTO (680,700,720,740,770), QFLG                                 S0203580
  680 IF(LINE .LT. 54) GOTO 690                                        S0203590
      WRITE(IO,9029) TITLE                                             S0203600
      WRITE(IO,9002)                                                   S0203610
      IF(DONE) WRITE(IO,9003)                                          S0203620
      WRITE(IO,9004) ((SEASON(I1,I2),I1=1,2),I2=1,4)                   S0203630
      LINE = 14                                                        S0203640
  690 IF(.NOT.DONE) WRITE(IO,9005) NSO                                 S0203650
      WRITE(IO,9006) (SOURCE(I1,I),I1=120,123)                         S0203660
      IF(DONE) GOTO 820                                                S0203670
      LINE = LINE + 3                                                  S0203680
      GOTO 800                                                         S0203690
  700 IF(LINE .LT. 54) GOTO 710                                        S0203700
      WRITE(IO,9029) TITLE                                             S0203710
      WRITE(IO,9007)                                                   S0203720
      IF(DONE) WRITE(IO,9003)                                          S0203730
      WRITE(IO,9008)                                                   S0203740
      WRITE(IO,9013)                                                   S0203750
      LINE = 14                                                        S0203760
  710 IF(.NOT. DONE) WRITE(IO,9009) NSO                                S0203770
      WRITE(IO,9010) (SOURCE(I1,I),I1=120,131)                         S0203780
      IF(DONE) GOTO 820                                                S0203790
      LINE = LINE + 3                                                  S0203800
      GOTO 800                                                          S0203810
  720 IF(LINE .LT. 50) GOTO 730                                         S0203820
      WRITE(IO,9029) TITLE                                              S0203830
      WRITE(IO,9011)                                                    S0203840
      IF(DONE) WRITE(IO,9003)                                           S0203850
      WRITE(IO,9012)                                                    S0203860
      WRITE(IO,9013)                                                    S0203870
      LINE = 14                                                         S0203880
  730 IF(.NOT.DONE) WRITE(IO,9009) NSO                                  S0203890
      WRITE(IO,9014) (I1,SOURCE(119+I1,I),I1=1,24)                      S0203900
      IF(DONE) GOTO 820                                                 S0203910
      LINE = LINE + 7                                                   S0203920
      GOTO 800                                                          S0203930
  740 IF(LINE .LT. 49) GOTO 750                                         S0203940
      WRITE(IO,9029) TITLE                                              S0203950
      WRITE(IO,9015)                                                    S0203960
      IF(DONE) WRITE(IO,9003)                                           S0203970
      WRITE(IO,9016) (I1,I1=1,6)                                        S0203980
      WRITE(IO,9013)                                                    S0203990
      LINE = 6                                                          S0204000
  750 IF(.NOT.DONE) WRITE(IO,9009) NSO                                  S0204010
      DO 760  I1 = 1,6                                                  S0204020
      IFR = (I1-1)*6 + 120                                              S0204030
      ITO = IFR + 5                                                     S0204040
  760 WRITE(IO,9017) ATHRUF(I1),(SOURCE(I2,I),I2=IFR,ITO)               S0204050
      IF(DONE) GOTO 820                                                 S0204060
      LINE = LINE + 8                                                   S0204070
      GOTO 800                                                          S0204080
  770 IF(LINE .LT. 37) GOTO 780                                         S0204090
      WRITE(IO,9029) TITLE                                              S0204100
      WRITE(IO,9018)                                                    S0204110
      IF(DONE) WRITE(IO,9003)                                           S0204120
      WRITE(IO,9012)                                                    S0204130
      WRITE(IO,9013)                                                    S0204140
      LINE = 14                                                         S0204150
  780 IF(.NOT.DONE) WRITE(IO,9009) NSO                                  S0204160
      DO 790  I1 = 1,4                                                  S0204170
      IFR = (I1-1)*24 + 119                                             S0204180
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            WRITE(IO,9019) SEASON(1,I1),SEASON(2,I1)                    S0204190
        790 WRITE(IO,9014) (I2,SOURCE(I2+IFR,I),I2=1,24)                S0204200
            IF(DONE) GOTO 820                                           S0204210
            LINE = LINE + 22                                            S0204220
        800 I = I + 1                                                   S0204230
            GOTO 660                                                    S0204240
        810 J = J + 1                                                   S0204250
            GOTO 650                                                    S0204260
      C     STORE RECIPROCAL SQUARED OF BETA1, BETA2 AS GAM1I, GAM2I AND STORES0204270
      C     RECIPROCAL OF ZR.                                           S0204280
        820 CONTINUE                                                    S0204290
            GAM1I = 1./(BETA1*BETA1)                                    S0204300
            GAM2I = 1./(BETA2*BETA2)                                    S0204310
            ZR = 1./ZR                                                  S0204320
      C     COMPUTE EFFECTIVE BUILDING WIDTH FOR ALL SOURCES & STORE IN S0204330
      C     LOCATION 12 OF 'SOURCE' ARRAY.  BUILDING LENGTH & WIDTH WILL NO   S0204340
      C     LONGER BE NEEDED.  ALSO, RELOCATE AREA SOURCE COORDINATES FROM    S0204350
      C     THE SOUTHWEST CORNER TO THE CENTER OF THE AREA SOURCE.      S0204360
            DO 830 I = 1,NSOURC                                         S0204370
      C     2/SQRT(3.14159265) = 1.1283792                              S0204380
            SOURCE(12,I) = 1.1283792*SQRT(SOURCE(12,I)*SOURCE(13,I))    S0204390
            ITYPE = SOURCE(1,I)                                         S0204400
            IF(ITYPE-(ITYPE/16)*16 .NE. 2) GOTO 830                     S0204410
            A1 = .5*SOURCE(9,I)                                         S0204420
            SOURCE(4,I) = SOURCE(4,I) + A1                              S0204430
            SOURCE(5,I) = SOURCE(5,I) + A1                              S0204440
        830 CONTINUE                                                    S0204450
      C     SET HEADING.                                                S0204460
            IF(ISW(1) .EQ. 1) GOTO 840                                  S0204470
            CONDEP(1) = 4H  TO                                          S0204480
            CONDEP(2) = 4HTAL                                           S0204490
            CONDEP(3) = 4HDEPO                                          S0204500
            CONDEP(4) = 4HSITI                                          S0204510
            CONDEP(5) = 4HON                                            S0204520
            CONDEP(6) = 4H                                              S0204530
            GOTO 850                                                    S0204540
        840 CONDEP(1) = 4HAVER                                          S0204550
            CONDEP(2) = 4HAGE                                           S0204560
      CONDEP(3) = 4HCONC                                                S0204570
      CONDEP(4) = 4HENTR                                                S0204580
      CONDEP(5) = 4HATIO                                                S0204590
      CONDEP(6) = 4HN                                                   S0204600
  850 CONTINUE                                                          S0204610
      RETURN                                                            S0204620
 9001 FORMAT(/34X,64H*** UPPER BOUND OF FIRST THROUGH FIFTH WIND SPEED CS0204630
     1ATEGORIES ***/60X,12H(METERS/SEC)//46X,5(F7.2,1H,))               S0204640
 9002 FORMAT(39X,54H* SOURCE EMISSION RATE SCALARS WHICH VARY SEASONALLYS0204650
     1 *//)                                                             S0204660
 9003 FORMAT(56X,19H* FOR ALL SOURCES *//)                              S0204670
 9004 FORMAT(40X,4(2A4,7X)/20X,40(2H- )/)                               S0204680
 9005 FORMAT(/20X,12HSOURCE NO. =,I6)                                   S0204690
 9006 FORMAT(38X,4(E10.5,5X))                                           S0204700
 9007 FORMAT(41X,51H* SOURCE EMISSION RATE SCALARS WHICH VARY MONTHLY * S0204710
     1 //)                                                              S0204720
 9008 FORMAT(7X,51HJANUARY  FEBRUARY   MARCH     APRIL      MAY       , S0204730
     1 58HJUNE      JULY      AUGUST   SEPTEMBER  OCTOBER  NOVEMBER  ,  S0204740
     2  8HDECEMBER/)                                                    S0204750
 9009 FORMAT(/13H SOURCE NO. =,I6)                                      S0204760
 9010 FORMAT(5X,12E10.4)                                                S0204770
 9011 FORMAT(32X,68H* SOURCE EMISSION RATE SCALARS WHICH VARY FOR EACH HS0204780
     1OUR OF THE DAY *//)                                               S0204790
 9012 FORMAT(5X,6(14HHOUR    SCALAR,6X))                                S0204800
 9013 FORMAT(1X,65(2H- )/)                                              S0204810
 9014 FORMAT(4(5X,6(I3,3X,E10.5,4X)/))                                  S0204820
 9015 FORMAT(30X,73H* SOURCE EMISSION RATE SCALARS WHICH VARY WITH STABIS0204830
     1LITY AND WIND SPEED *//)                                          S0204840
 9016 FORMAT(16X,9HSTABILITY,29X,19HWIND SPEED CATEGORY/16X,8HCATEGORY, S0204850
     1 9X,6(I1,14X))                                                    S0204860
 9017 FORMAT(19X,A1,5X,6(5X,E10.5))                                     S0204870
 9018 FORMAT(32X,68H* SOURCE EMISSION RATE SCALARS WHICH VARY SEASONALLYS0204880
     1 AND DIURNALLY *//)                                               S0204890
 9019 FORMAT(59X,9HSEASON = ,2A4)                                       S0204900
 9020 FORMAT(8F10.0)                                                    S0204910
 9021 FORMAT(E8.0,3F8.0,3A4,7A4,2I2)                                    S0204920
 9022 FORMAT(80I1)                                                      S0204930
 9023 FORMAT(20I4)                                                      S0204940
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9024 FORMAT(13I6)                                                      S0204950
9025 FORMAT(1H1,10X,63H*** ERROR ***  MET DATA REQUESTED DOES NOT MATCHS0204960
    1 MET DATA READ./10X,28H'REQUESTED/READ' VALUES ARE:/10X,          S0204970
    2 21HSURFACE STATION NO. =,I6,1H/,I6,23H YEAR OF SURFACE DATA =,I6,S0204980
    3 1H/,I6/10X,23HUPPER AIR STATION NO. =,I6,1H/,I6,                 S0204990
    4 25H YEAR OF UPPER AIR DATA =,I6,1H/,I6/10X,15HRUN TERMINATED.)   S0205000
9026 FORMAT(1H1,10X,73H*** ERROR ***  NUMBER OF SOURCES TO BE READ EQUAS0205010
    1LS ZERO.  RUN TERMINATED.)                                        S0205020
9027 FORMAT(I5,2I1,I2,I1,E8.0,2F7.0,8F6.0)                             S0205030
9028 FORMAT(9X,I1,5F10.0)                                              S0205040
9029 FORMAT(1H1//32X,4H*** ,15A4,4H ***//)                             S0205050
9030 FORMAT(18X,40HCALCULATE (CONCENTRATION=1,DEPOSITION=2),29X,       S0205060
    1 8HISW(1) =,I4/18X,55HRECEPTOR GRID SYSTEM (RECTANGULAR=1 OR 3, POS0205070
    2LAR=2 OR 4),14X,8HISW(2) =,I4/                                    S0205080
    3 18X,48HDISCRETE RECEPTOR SYSTEM (RECTANGULAR=1,POLAR=2),21X,     S0205090
    4 8HISW(3) =,I4/,18X,40HTERRAIN ELEVATIONS ARE READ (YES=1,NO=0),  S0205100
    5 29X,8HISW(4) =,I4/,18X,                                          S0205110
    6 45HCALCULATIONS ARE WRITTEN TO TAPE (YES=1,NO=0),24X,8HISW(5) =, S0205120
    7 I4/18X,                                                          S0205130
    8 48HLIST ALL INPUT DATA (NO=0,YES=1,MET DATA ALSO=2),21X,         S0205140
    9 8HISW(6) =,I4//18X,39HCOMPUTE AVERAGE CONCENTRATION (OR TOTAL,   S0205150
    0 12H DEPOSITION)/18X,32HWITH THE FOLLOWING TIME PERIODS:/20X,     S0205160
    1 19HHOURLY (YES=1,NO=0),48X,8HISW(7) =,I4/20X,                    S0205170
    2 19H2-HOUR (YES=1,NO=0),48X,8HISW(8) =,I4/20X,                    S0205180
    3 19H3-HOUR (YES=1,NO=0),48X,8HISW(9) =,I4/20X,                    S0205190
    4 19H4-HOUR (YES=1,NO=0),47X,9HISW(10) =,I4/20X,                   S0205200
    5 19H6-HOUR (YES=1,NO=0),47X,9HISW(11) =,I4/20X,                   S0205210
    6 19H8-HOUR (YES=1,NO=0),47X,9HISW(12) =,I4/20X,                   S0205220
    7 20H12-HOUR (YES=1,NO=0),46X,9HISW(13) =,I4/20X,                  S0205230
    8 20H24-HOUR (YES=1,NO=0),46X,9HISW(14) =,I4)                      S0205240
9031 FORMAT(18X,35HPRINT 'N'-DAY TABLE(S) (YES=1,NO=0),33X,            S0205250
    1 9HISW(15) =,I4//18X,58HPRINT THE FOLLOWING TYPES OF TABLES WHOSE S0205260
    2TIME PERIODS ARE/18X,36HSPECIFIED BY ISW(7) THROUGH ISW(14):/20X, S0205270
    3 25HDAILY TABLES (YES=1,NO=0),41X,9HISW(16) =,I4/20X,             S0205280
    4 44HHIGHEST & SECOND HIGHEST TABLES (YES=1,NO=0),22X,9HISW(17) =, S0205290
    5 I4/20X,30HMAXIMUM 50 TABLES (YES=1,NO=0),36X,9HISW(18) =,I4/18X, S0205300
    6 57HMETEOROLOGICAL DATA INPUT METHOD (PRE-PROCESSED=1,CARD=2),11X,S0205310
    7 9HISW(19) =,I4/18X,58HRURAL-URBAN OPTION (RURAL=0,URBAN MODE 1=1,S0205320
     8URBAN MODE 2=2),10X,9HISW(20) =,I4/18X,57HWIND PROFILE EXPONENT VAS0205330
     9LUES (DEFAULTS=1,USER ENTERS=2,3),11X,9HISW(21) =,I4/18X,        S0205340
     0 64HVERTICAL POT. TEMP. GRADIENT VALUES (DEFAULTS=1,USER ENTERS=2,S0205350
     13),4X,9HISW(22) =,I4/18X,49HSCALE EMISSION RATES FOR ALL SOURCES (S0205360
     2NO=0,YES>0),19X,9HISW(23) =,I4/18X,53HPROGRAM CALCULATES FINAL PLUS0205370
     3ME RISE ONLY (YES=1,NO=2),15X,9HISW(24) =,I4/18X,                S0205380
     4 59HPROGRAM ADJUSTS ALL STACK HEIGHTS FOR DOWNWASH (YES=2,NO=1),  S0205390
     5  9X,9HISW(25) =,I4)                                              S0205400
 9032 FORMAT(/18X,23HNUMBER OF INPUT SOURCES,46X,8HNSOURC =,I4/18X,     S0205410
     1 40HNUMBER OF SOURCE GROUPS (=0,ALL SOURCES),29X,8HNGROUP =,I4/18XS0205420
     2,53HTIME PERIOD INTERVAL TO BE PRINTED (=0,ALL INTERVALS),17X,    S0205430
     3 7HIPERD =,I4/18X,31HNUMBER OF X (RANGE) GRID VALUES,38X,8HNXPNTS S0205440
     4=,I4/18X,31HNUMBER OF Y (THETA) GRID VALUES,38X,8HNYPNTS =,I4/18X,S0205450
     5 28HNUMBER OF DISCRETE RECEPTORS,41X,8HNXWYPT =,I4)               S0205460
 9033 FORMAT(18X,46HNUMBER OF HOURS PER DAY IN METEOROLOGICAL DATA,23X, S0205470
     1 8HNHOURS =,I4/18X,37HNUMBER OF DAYS OF METEOROLOGICAL DATA,32X,  S0205480
     2 8H NDAYS =,I4)                                                   S0205490
 9034 FORMAT(18X,44HSOURCE EMISSION RATE UNITS CONVERSION FACTOR,27X,   S0205500
     1 6H   TK =,E10.5/18X,47HENTRAINMENT COEFFICIENT FOR UNSTABLE ATMOSPS0205510
     2HERE,22X,8H BETA1 =,F5.3/18X,45HENTRAINMENT COEFFICIENT FOR STABLES0205520
     3 ATMOSPHERE,24X,8H BETA2 =,F5.3/,18X,                             S0205530
     4 52HHEIGHT ABOVE GROUND AT WHICH WIND SPEED WAS MEASURED,18X,     S0205540
     5 7H   ZR =,F7.2,8H  METERS/18X,                                   S0205550
     6 42HLOGICAL UNIT NUMBER OF METEOROLOGICAL DATA,29X,6HIMET =,I4)   S0205560
 9035 FORMAT(18X,52HDECAY COEFFICIENT FOR PHYSICAL OR CHEMICAL DEPLETIONS0205570
     1 ,18X,7HDECAY =,E12.6/18X,19HSURFACE STATION NO.,                 S0205580
     3 53X,5HISS =,I6/18X,20HYEAR OF SURFACE DATA,52X,5HISY =,I3/18X,   S0205590
     4 21HUPPER AIR STATION NO.,51X,5HIUS =,I6/18X,                     S0205600
     5 22HYEAR OF UPPER AIR DATA,50X,5HIUY =,I3)                        S0205610
 9036 FORMAT(18X,39HLOGICAL UNIT OF CALCULATION 'SAVE' TAPE,30X,        S0205620
     1 8H ITAP  =,I4)                                                   S0205630
 9037 FORMAT(44X,43H*** METEOROLOGICAL DAYS TO BE PROCESSED ***/        S0205640
     1 63X,6H(1F=1)//8(11X,5(10I2,2X)/))                                S0205650
 9038 FORMAT(//42X,48H*** X-COORDINATES OF RECTANGULAR GRID SYSTEM ***/ S0205660
     1 62X,8H(METERS)/)                                                 S0205670
 9039 FORMAT(//47X,35H*** RANGES OF POLAR GRID SYSTEM ***/62X,          S0205680
     1 8H(METERS)/)                                                     S0205690
 9040 FORMAT(100(5X,10(F10.1,1H,)/))                                    S0205700
 9041 FORMAT(//42X,48H*** Y-COORDINATES OF RECTANGULAR GRID SYSTEM ***  S0205710
     1 /62X,8H(METERS)/)                                                S0205720
 9042 FORMAT(//45X,42H*** RADIAL ANGLES OF POLAR GRID SYSTEM ***/       S0205730
     1 /62X,9H(DEGREES)/)                                               S0205740
 9043 FORMAT(//47X,45H*** X,Y COORDINATES OF DISCRETE RECEPTORS ***/    S0205750
     1 62X,8H(METERS)/)                                                 S0205760
 9044 FORMAT(//39X,53H*** RANGE,THETA COORDINATES OF DISCRETE RECEPTORS S0205770
     1***/58X,16H(METERS,DEGREES)/)                                     S0205780
 9045 FORMAT(100(6X,5(1H(,F9.1,1H,,F9.1,4H),   )/))                     S0205790
 9046 FORMAT(55X,19H*** SOURCE DATA ***//21X,13HEMISSION RATE,38X,      S0205800
     1 5HTEMP.,4X,9HEXIT VEL./24X,8HTYPE=0,1,40X,2(6HTYPE=0,4X)/10X,    S0205810
     2 3HT W,8X,3A4,38X,18H(DEG.K))   (M/SEC)),12X,3(5HBLDG.,4X)/10X,   S0205820
     3 20HY A NUMBER     TYPE=2,25X,4HBASE,12X,53HVERT.DIM  HORZ.DIM DIAMS0205830
     4ETER  HEIGHT   LENGTH    WIDTH/3X,19HSOURCE P K  PART.  ,3A4,5X,  S0205840
     5 1HX,8X,43HY       ELEV.   HEIGHT   TYPE=1   TYPE=1,2  ,4(6HTYPE=0,S0205850
     6 3X)/3X,31HNUMBER E E  CATS. *PER METER**2,2(5(1X,2A4),1X)/       S0205860
     7 63(2H -)/)                                                       S0205870
 9047 FORMAT(I8,I3,I2,I5,3X,E11.5,2F10.1,F8.1,2F9.2,1X,5F9.2)           S0205880
 9048 FORMAT(I8,I3,I2,I5,3X,2A4,A3,1X,2F9.1,3F9.2,1X,5F9.2)             S0205890
 9049 FORMAT(50X,31H*** SOURCE PARTICULATE DATA ***//)                  S0205900
 9050 FORMAT(/10X,19H*** SOURCE NUMBER =,I6,4H ***)                     S0205910
 9051 FORMAT(/10X,15HMASS FRACTION =/2(10X,10(F7.5,1H,)/))              S0205920
 9052 FORMAT(/10X,31HSETTLING VELOCITY(METERS/SEC) =/2(10X,10(F7.4,1H,) S0205930
     1 /))                                                              S0205940
 9053 FORMAT(/10X,32HSURFACE REFLECTION COEFFICIENT =/2(10X,10(F7.5,1H, S0205950
     1 )/))                                                             S0205960
 9054 FORMAT(34X,27H* SEASONAL SOURCE STRENGTHS,3A4,                    S0205970
     1 26HFOR EACH HOUR OF THE DAY *//20H *** SOURCE NUMBER =,I5,4H ***)S0205980
 9055 FORMAT(/4X,A4,A2/2(/4X,4HHOUR,I8,11I10/2X,8HSTRENGTH,12E10.4))    S0205990
 9056 FORMAT(18X,22HALLOCATED DATA STORAGE,48X,7HLIMIT =,I6,6H WORDS/   S0206000
     1 18X,42HREQUIRED DATA STORAGE FOR THIS PROBLEM RUN,28X,           S0206010
     2  7HMIMIT =,I6,6H WORDS)                                          S0206020
 9057 FORMAT(1H0,33X,65H*** NUMBER OF SOURCE NUMBERS REQUIRED TO DEFINE S0206030
     1SOURCE GROUPS ***/62X,8H(NSOGRP)//3(15X,20(I4,1H,)/))             S0206040
 9058 FORMAT(1H0,43X,45H*** SOURCE NUMBERS DEFINING SOURCE GROUPS ***/  S0206050
     1 62X,7H(IDSOR)//8(15X,14(I6,1H,)/))                               S0206060
 9059 FORMAT(//51X,30H*** WIND PROFILE EXPONENTS ***//)                 S0206070
 9060 FORMAT(//42X,48H*** VERTICAL POTENTIAL TEMPERATURE GRADIENTS ***/ S0206080
609*          1 53X,26H(DEGREES KELVIN PER METER)//)                            S0206090
610*           END                                                              S0206100
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      SUBROUTINE MODEL(CALC,CHIAV,CHIAN,GRIDX,GRIDY,XDIS,YDIS,GRIDZ,    S0300010
     1 CHIMAX,CHI50,IPNT,ICOUNT,SOURCE)                                 S0300020
C     THIS ROUTINE CONTAINS THE MODEL EQUATIONS FOR CALCULATING GROUND- S0300030
C     LEVEL CONCENTRATION OR DEPOSITION INCLUDING THE PLUME RISE        S0300040
C     EQUATIONS.  THIS ROUTINE ALSO CONTROLS THE CALCULATION AND OUTPUT S0300050
C     OF ALL TABLES THE PROGRAM PRODUCES.                               S0300060
C                                                                       S0300070
      INTEGER TITLE,QFLG,QFLGS                                          S0300080
      LOGICAL FZERO,WAKE,POLAR,DONE,SGZDON,IFLAG(8),ISW24               S0300090
      COMMON /LOGIX/ ISW(40),NSOURC,NXPNTS,NYPNTS,NXWYPT,NGROUP,        S0300100
     1 NSOGRP(150),IDSOR(200),IPERD,NPNTS,NAVG,NHOURS,NDAYS,NTDAY,LINE, S0300110
     2 IO,IN,TITLE(15),IQUN(3),ICHIUN(7),CONDEP(6),LIMIT,MIMIT          S0300120
      COMMON /MET/ IDAY(366),ISTAB(24),AWS(24),TEMP(24),AFV(24),        S0300130
     1 AFVR(24),HLH(24,2),P(24),DTHDZ(24),DECAY(24),PDEF(6,6),          S0300140
     2 DTHDEF(6,6),GAM1I,GAM2I,ZR,DDECAY,IMET,ITAP,TK,UCATS(5)          S0300150
      DIMENSION CALC(1),CHIAV(1),CHIAN(1),GRIDX(1),GRIDY(1),XDIS(1),    S0300160
     1 YDIS(1),GRIDZ(1),CHIMAX(1),CHI50(150,1),IPNT(50,1),ICOUNT(1),    S0300170
     2 SOURCE(215,1)                                                    S0300180
      DIMENSION COSNUM(360),SINNUM(451),RLH(48),SASIGZ(36),SBSIGZ(36),  S0300190
     1 SP(6),SQ(6),SC(6),SD(6),KAVG(8),MSTAB(24),IMOS(11),ISEAS(12)     S0300200
      EQUIVALENCE (COSNUM(1),SINNUM(91)),(ISW20,ISW(40)),(VS,SIGYO,XO), S0300210
     1 (TS,SIGZO),(POLAR,DONE),(ISW(23),QFLGS)                          S0300220
      DATA SASIGZ / 158.08,170.22,179.52,217.41,258.89,346.75,2*453.85, S0300230
     1 90.673,98.483,109.3,61.141,34.459,32.093,32.093,33.504,36.65,    S0300240
     2 44.053,23.331,21.628,21.628,22.534,24.703,26.97,35.42,47.618,    S0300250
     3 15.209,14.457,13.953,13.953,14.823,16.187,17.836,22.651,27.074,  S0300260
     4 34.219 /                                                         S0300270
      DATA SBSIGZ / 1.0542,1.0932,1.1262,1.2644,1.4094,1.7283,2*2.1166, S0300280
     1 .93198,.98332,1.0971,.91465,.86974,.81066,.64403,.60486,.56589,  S0300290
     2 .51179,.81956,.75660,.63077,.57154,.50527,.46713,.37615,.29592,  S0300300
     3 .81558,.78407,.68465,.63227,.54503,.46490,.41507,.32681,.27436,  S0300310
     4 .21716 /                                                         S0300320
      DATA SC,SD / 24.1667,18.333,12.5,8.333,6.25,4.1667,2.5334,1.8096, S0300330
     1 1.0857,.72382,.54287,.36191 /, SP,SQ / .004781486,.006474168,    S0300340
     2 .009684292,.014649868,.019584802,.029481132,1.1235955,1.1086475, S0300350
     3 1.0905125,1.0881393,1.0857763,1.0881393 /                        S0300360
      DATA KAVG / 1,2,3,4,6,8,12,24 /                                   S0300370
      DATA IMOS / 32,61,92,122,153,183,214,245,275,306,336 /            S0300380
      DATA ISEAS / 1,1,2,2,2,3,3,3,4,4,4,1 /                           S0300390
C                                                                      S0300400
C***  INITIALIZE.                                                      S0300410
C                                                                      S0300420
      ISW24 = ISW(24) .EQ. 1                                           S0300430
C     INITIALIZE COSNUM & SINNUM ARRAYS WITH COSINE & SINE VALUES OF   S0300440
C     INTEGER WIND DIRECTIONS.                                         S0300450
      DO 10  I = 1,451                                                 S0300460
      A1 = I                                                           S0300470
   10 SINNUM(I) = SIN(A1*.017453293)                                   S0300480
C     IF MAX 50 TABLES ARE NOT COMPUTED, ICOUNT & IPNT DO NOT EXIST.   S0300490
      IF(ISW(18) .LE. 0) GOTO 30                                       S0300500
C     INITIALIZE POINTER ARRAY & COUNTER FOR MAXIMUM FIFTY TABLES.     S0300510
      I1 = NAVG                                                        S0300520
      IF(NGROUP .GT. 0) I1 = I1*NGROUP                                 S0300530
      DO 20  I = 1,I1                                                  S0300540
      ICOUNT(I) = 0                                                    S0300550
      DO 20  J = 1,50                                                  S0300560
   20 IPNT(J,I) = J                                                    S0300570
C     CALCULATE VIRTUAL DISTANCES FOR ALL SOURCES AND STABILITY        S0300580
C     CATEGORIES.  ALSO CHECK SOURCE-RECEPTOR DISTANCES.               S0300590
   30 LINE = 100                                                       S0300600
      DO 310 I = 1,NSOURC                                              S0300610
      ITYPE = SOURCE(1,I)                                              S0300620
      IWAK = ITYPE/8192                                                S0300630
      ITYPE = ITYPE - (ITYPE/16)*16                                    S0300640
      IF(ITYPE-1) 40 ,110,140                                          S0300650
   40 HB = SOURCE(11,I)                                                S0300660
      HW = SOURCE(12,I)                                                S0300670
      IF(HB .LE. 0.0 .AND. HW .LE. 0.0) GOTO 190                       S0300680
      H = HB                                                           S0300690
      IF(HW .LT. HB) H = HW                                            S0300700
      DO 50  J = 1,36                                                  S0300710
   50 SOURCE(81+J,I) = (1.2*H/SASIGZ(J))**(1./SBSIGZ(J)) - .01*H       S0300720
      IF(HW .GE. HB) GOTO 70                                           S0300730
      DO 60  J = 1,6                                                   S0300740
   60 SOURCE(75+J,I) = (.85*HW*SP(J))**SQ(J) - .01*HW                  S0300750
      GOTO 160                                                         S0300760
   70 IF(HW .GT. 5.*HB) GOTO 90                                     S0300770
      DO 80  J = 1,6                                                S0300780
   80 SOURCE(75+J,I) = ((.35*HW+.5*HB)*SP(J))**SQ(J) - .01*HB       S0300790
      GOTO 160                                                      S0300800
   90 H = .85*HB                                                    S0300810
      IF(IWAK .EQ. 1) H = 2.25*HB                                   S0300820
      DO 100 J = 1,6                                                S0300830
  100 SOURCE(75+J,I) = (H*SP(J))**SQ(J) - .01*HB                    S0300840
      GOTO 160                                                      S0300850
  110 SIGYO = SOURCE(9,I)                                           S0300860
      SIGZO = SOURCE(8,I)                                           S0300870
      DO 120 J = 1,6                                                S0300880
  120 IF(SIGYO .GT. 0.0) SOURCE(75+J,I) = (SIGYO*SP(J))**SQ(J)      S0300890
      DO 130 J = 1,36                                               S0300900
  130 IF(SIGZO .GT. 0.0) SOURCE(81+J,I) = (SIGZO/SASIGZ(J))**       S0300910
     1                                    (1./SBSIGZ(J))            S0300920
      GOTO 160                                                      S0300930
  140 XO = SOURCE(9,I)                                              S0300940
      DO 150 J = 1,36                                               S0300950
  150 SOURCE(81+J,I) = .001*XO                                      S0300960
C     NO VIRTUAL DISTANCES CAN BE LESS THAN ZERO.                   S0300970
  160 DO 170 J = 1,6                                                S0300980
  170 IF(SOURCE(75+J,I) .LT. 0.0) SOURCE(75+J,I) = 0.0              S0300990
      DO 180 J = 1,36                                               S0301000
  180 IF(SOURCE(81+J,I) .LT. 0.0) SOURCE(81+J,I) = 0.0              S0301010
  190 A1 = 99.99                                                    S0301020
      IF(ITYPE-1) 200  ,210  ,220                                   S0301030
  200 XOP = 0.0                                                     S0301040
      H = HB                                                        S0301050
      IF(HW .LT. HB) H = HW                                         S0301060
      A1 = 3.*H                                                     S0301070
      IF(A1 .LT. 99.99) A1 = 99.99                                  S0301080
      GOTO 230                                                      S0301090
  210 XOP = 2.15*SIGYO                                              S0301100
      GOTO 230                                                      S0301110
  220 XOP = .5641896*SOURCE(9,I)                                    S0301120
  230 NSO = SOURCE(2,I)                                             S0301130
      XS = SOURCE(4,I)                                              S0301140
      YS = SOURCE(5,I)                                                  S0301150
      IF(NXPNTS .EQ. 0 .OR. NYPNTS .EQ. 0) GOTO 270                     S0301160
      POLAR = .FALSE.                                                   S0301170
      IF(ISW(2) .EQ. 2 .OR. ISW(2) .EQ. 4) POLAR = .TRUE.               S0301180
      DO 260  J = 1,NYPNTS                                              S0301190
      YR = GRIDY(J)                                                     S0301200
      I1 = YR                                                           S0301210
      DO 260   K = 1,NXPNTS                                             S0301220
      XR = GRIDX(K)                                                     S0301230
      IF(.NOT.POLAR) GOTO 240                                           S0301240
      YR = XR*COSNUM(I1)                                                S0301250
      XR = XR*SINNUM(I1)                                                S0301260
  240 A3 = YR - YS                                                      S0301270
      XR = XR - XS                                                      S0301280
      A2 = SQRT(XR*XR + A3*A3) - XOP                                    S0301290
      IF(A2 .GE. A1) GOTO 260                                           S0301300
      IF(LINE .LT. 57) GOTO 250                                         S0301310
      WRITE(IO,9011)                                                    S0301320
      WRITE(IO,9005) TITLE                                              S0301330
      WRITE(IO,9002) CONDEP                                             S0301340
      LINE = 16                                                         S0301350
  250 WRITE(IO,9003) NSO,GRIDX(K),GRIDY(J),A2                           S0301360
      LINE = LINE + 1                                                   S0301370
  260 CONTINUE                                                          S0301380
  270 IF(NXWYPT .EQ. 0) GOTO 310                                        S0301390
      POLAR = .FALSE.                                                   S0301400
      IF(ISW(3) .EQ. 2) POLAR = .TRUE.                                  S0301410
      DO 300  J = 1,NXWYPT                                              S0301420
      YR = YDIS(J)                                                      S0301430
      XR = XDIS(J)                                                      S0301440
      IF(.NOT.POLAR) GOTO 280                                           S0301450
      I1 = YR                                                           S0301460
      YR = XR*COSNUM(I1)                                                S0301470
      XR = XR*SINNUM(I1)                                                S0301480
  280 YR = YR - YS                                                      S0301490
      XR = XR - XS                                                      S0301500
      A2 = SQRT(XR*XR + YR*YR) - XOP                                    S0301510
      IF(A2 .GE. A1) GOTO 300                                           S0301520
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           IF(LINE .LT. 57) GOTO 290                                          S0301530
           WRITE(IO,9005) TITLE                                               S0301540
           WRITE(IO,9002) CONDEP                                              S0301550
           LINE = 16                                                          S0301560
       290 WRITE(IO,9003) NSO,XDIS(J),YDIS(J),A2                              S0301570
           LINE = LINE + 1                                                    S0301580
       300 CONTINUE                                                           S0301590
       310 CONTINUE                                                           S0301600
     C     INITIALIZE NUMBER DAYS, HOURS & HOURS PER DAY. SET MIXING HEIGHT   S0301610
     C     INDEX.                                                             S0301620
           NTDAY = 0                                                          S0301630
           IF(ISW(19) .GT. 1) GOTO 320                                        S0301640
           NHOURS = 24                                                        S0301650
       320 IHM = 1                                                            S0301660
           IF(ISW(20) .GT. 0) IHM = 2                                         S0301670
     C                                                                        S0301680
     C***  BEGIN LOOP OVER DAYS OF METEOROLOGICAL DATA.                       S0301690
     C                                                                        S0301700
           DO 1690 IDY = 1,NDAYS                                              S0301710
           IF(ISW(19) .EQ. 1) GOTO 380                                        S0301720
     C     INPUT A DAY OF CARD MET DATA.                                      S0301730
           DO 370 I = 1,NHOURS                                                S0301740
           READ(IMET,9004) JDAY,AFV(I),AWS(I),HLH(I,1),TEMP(I),DTHDZ(I),      S0301750
          1 ISTAB(I),P(I),DECAY(I)                                            S0301760
           IF(ISTAB(I) .GT. 6) ISTAB(I) = 6                                   S0301770
           AFVR(I) = AFV(I)                                                   S0301780
           IF(JDAY .LT. 1) JDAY = 1                                           S0301790
           IF(ISW(21) .EQ. 3 .AND. ISW(22) .EQ. 3) GOTO 350                   S0301800
     C     COMPUTE WIND SPEED CATEGORY IN ORDER TO LOAD DEFAULT VALUE FOR     S0301810
     C     P OR DTHDZ.                                                        S0301820
           IST = ISTAB(I)                                                     S0301830
           DO 330 J = 1,5                                                     S0301840
           ISP = J                                                            S0301850
           IF(UCATS(J) .GE. AWS(I)) GOTO 340                                  S0301860
       330 CONTINUE                                                           S0301870
           ISP = 6                                                            S0301880
       340 IF(ISW(21) .NE. 3) P(I) = PDEF(ISP,IST)                            S0301890
           IF(ISW(22) .NE. 3) DTHDZ(I) = DTHDEF(ISP,IST)                      S0301900
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  350 IF(ISW(6) .NE. 2) GOTO 370                                        S0301910
      IF(I .GT. 1) GOTO 360                                             S0301920
      JDY = JDAY                                                        S0301930
      WRITE(IO,9001) JDAY                                               S0301940
      WRITE(IO,9005) TITLE                                              S0301950
      WRITE(IO,9007) JDAY                                               S0301960
      WRITE(IO,9006)                                                    S0301970
  360 WRITE(IO,9008) I,AFV(I),AWS(I),HLH(I,1),TEMP(I),DTHDZ(I),         S0301980
     1 ISTAB(I),P(I),DECAY(I)                                           S0301990
  370 CONTINUE                                                          S0302000
      LINE = 0                                                          S0302010
      GOTO 480                                                          S0302020
C     INPUT PRE-PROCESSED MET DATA.                                     S0302030
  380 IF(IDAY(IDY) .GT. 0) GOTO 410                                     S0302040
      I1 = IDY + 1                                                      S0302050
      IF(IDAY(I1) .GT. 0) GOTO 390                                      S0302060
      READ(IMET) ISTAB                                                  S0302070
      GOTO 1690                                                         S0302080
  390 READ(IMET) JYR,IMO,DAY,ISTAB                                      S0302090
      LSTAB = ISTAB(1)                                                  S0302100
      IF(LSTAB .GT. 6) LSTAB = 6                                        S0302110
      DO 400 I = 2,24                                                   S0302120
      IF(ISTAB(I) .GT. 6) ISTAB(I) = 6                                  S0302130
      KSTT = ISTAB(I) - LSTAB                                           S0302140
      IF(KSTT .GT. 1) ISTAB(I) = LSTAB + 1                              S0302150
      IF(KSTT .LT. -1) ISTAB(I) = LSTAB - 1                             S0302160
  400 LSTAB = ISTAB(I)                                                  S0302170
      GOTO 1690                                                         S0302180
  410 READ(IMET) JYR,IMO,DAY,ISTAB,AWS,TEMP,AFV,AFVR,HLH                S0302190
C     REARRANGE MIXING HEIGHTS.                                         S0302200
      DO 420 I = 1,2                                                    S0302210
      DO 420 J = 1,24                                                   S0302220
      K = (24*(I-1)) + J                                                S0302230
  420 RLH(K) = HLH(J,I)                                                 S0302240
      DO 430 I = 1,48,2                                                 S0302250
      J = .5*I + 1                                                      S0302260
  430 HLH(J,1) = RLH(I)                                                 S0302270
      DO 440 I = 2,49,2                                                 S0302280
      J = .5*I                                                          S0302290
  440 HLH(J,2) = RLH(I)                                                 S0302300
      IF(IDY .EQ. 1) LSTAB = ISTAB(1)                                   S0302310
      IF(LSTAB .GT. 6) LSTAB = 6                                        S0302320
C     DO NOT ALLOW STABILITY TO VARY RAPIDLY & ADJUST FOR URBAN MODES.  S0302330
      DO 460 I = 1,24                                                   S0302340
      IF(ISTAB(I) .GT. 6) ISTAB(I) = 6                                  S0302350
      MSTAB(I) = ISTAB(I)                                               S0302360
      KSTT = ISTAB(I) - LSTAB                                           S0302370
      IF(KSTT .GT. 1) ISTAB(I) = LSTAB + 1                              S0302380
      IF(KSTT .LT. -1) ISTAB(I) = LSTAB - 1                             S0302390
      IF(ISW(20) .EQ. 0) GOTO 460                                       S0302400
      IF(ISW(20) .EQ. 1) GOTO 450                                       S0302410
      IF(ISTAB(I) .EQ. 6) ISTAB(I) = ISTAB(I) - 1                       S0302420
      GOTO 460                                                          S0302430
  450 IF(ISTAB(I) .GT. 4) ISTAB(I) = 4                                  S0302440
  460 LSTAB = ISTAB(I)                                                  S0302450
      IF(ISW(6) .NE. 2) GOTO 480                                        S0302460
      WRITE(IO,9001) IDY                                                S0302470
      WRITE(IO,9005) TITLE                                              S0302480
      WRITE(IO,9007) IDY                                                S0302490
      WRITE(IO,9009)                                                    S0302500
      DO 470 I = 1,24                                                   S0302510
  470 WRITE(IO,9010) I,AFV(I),AFVR(I),AWS(I),HLH(I,IHM),TEMP(I),        S0302520
     1 MSTAB(I),ISTAB(I)                                                S0302530
      LINE = 0                                                          S0302540
  480 CONTINUE                                                          S0302550
C     SET JULIAN DAY.                                                   S0302560
      IF(ISW(19) .EQ. 1) JDY = IDY                                      S0302570
C     FETCH SEASON & MONTH.                                             S0302580
      IF(ISW(19) .EQ. 1) GOTO 500                                       S0302590
      DO 490 I = 1,11                                                   S0302600
      IMO = I                                                           S0302610
      IF(IMOS(I) .GT. JDY) GOTO 500                                     S0302620
  490 CONTINUE                                                          S0302630
      IMO = 12                                                          S0302640
  500 CONTINUE                                                          S0302650
      ISEA = ISEAS(IMO)                                                 S0302660
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C                                                                       S0302670
C***  BEGIN LOOP OVER MET DATA FOR EACH HOUR.                           S0302680
C                                                                       S0302690
      DO 1670 IHR = 1,NHOURS                                            S0302700
      IST = ISTAB(IHR)                                                  S0302710
C     IF URBAN MODE 2, ADJUST STABILITY FOR CALCULATION OF SIGY & SIGZ. S0302720
      ISTUM2 = IST                                                      S0302730
      IF(ISW(20) .EQ. 2) ISTUM2 = IST - 1                               S0302740
      IF(ISTUM2 .LT. 1) ISTUM2 = 1                                      S0302750
      UBAR = AWS(IHR)                                                   S0302760
      FV = AFV(IHR)                                                     S0302770
      FVR = AFVR(IHR)                                                   S0302780
      HM = HLH(IHR,IHM)                                                 S0302790
C     SET MIXING HEIGHT TO 10000.0 SO THAT ONLY FIRST TERM OF VERTICAL  S0302800
C     EQUATION IS COMPUTED (RURAL MODE, E & F STABILITIES ONLY).        S0302810
      IF(ISW(20) .EQ. 0 .AND. IST .GT. 4) HM = 10000.0                  S0302820
      TA = TEMP(IHR)                                                    S0302830
      IF(HM .GT. 0.0) HMI = 1./HM                                       S0302840
C     COMPUTE WIND SPEED CATEGORY FOR THIS HOUR.                        S0302850
      DO 510 I = 1,5                                                    S0302860
      ISP = I                                                           S0302870
      IF(UCATS(I) .GE. UBAR) GOTO 520                                   S0302880
  510 CONTINUE                                                          S0302890
      ISP = 6                                                           S0302900
  520 IF(ISW(19) .EQ. 2) GOTO 530                                       S0302910
      PP = PDEF(ISP,IST)                                                S0302920
      DTH = DTHDEF(ISP,IST)                                             S0302930
      DECAY(IHR) = DDECAY                                               S0302940
      GOTO 540                                                          S0302950
  530 PP = P(IHR)                                                       S0302960
      DTH = DTHDZ(IHR)                                                  S0302970
  540 CONTINUE                                                          S0302980
C     CLEAR CALCULATION ARRAY FOR SOURCE SUMMATIONS.                    S0302990
      NPNTS2 = NPNTS + NPNTS                                            S0303000
      DO 550 I = 1,NPNTS2                                               S0303010
  550 CALC(I) = 0.0                                                     S0303020
C     SET IFLAG FOR DAILY TABLES IF HOUR/TIME PERIOD = INTEGER MULTIPLE.S0303030
      DO 560  I = 1,8                                                   S0303040
      IF(ISW(I+6) .NE. 1) GOTO 560                                      S0303050
      IFLAG(I) = .FALSE.                                                S0303060
      IF(MOD(IHR,KAVG(I)) .EQ. 0) IFLAG(I) = .TRUE.                     S0303070
  560 CONTINUE                                                          S0303080
      IF(HM .LE. 0.0) GOTO 1490                                         S0303090
C     COMPUTE X & Y SCALARS OF RANDOM FLOW VECTOR.                      S0303100
      FVRCOS = (FVR+180.)*.017453293                                    S0303110
      FVRSIN = SIN(FVRCOS)                                              S0303120
      FVRCOS = COS(FVRCOS)                                              S0303130
C                                                                       S0303140
C***  BEGIN LOOP OVER SOURCES.                                          S0303150
C                                                                       S0303160
      DO 1480 IS = 1,NSOURC                                             S0303170
C     CLEAR CALCULATION ARRAY FOR EACH SOURCE.                          S0303180
      DO 570 I = 1,NPNTS                                                S0303190
  570 CALC(I) = 0.0                                                     S0303200
      HS = SOURCE(7,IS)                                                 S0303210
      IF(HS .GT. HM) GOTO 1480                                          S0303220
      ITYPE = SOURCE(1,IS)                                              S0303230
      XS = SOURCE(4,IS)                                                 S0303240
      YS = SOURCE(5,IS)                                                 S0303250
      ZS = SOURCE(6,IS)                                                 S0303260
      VS = SOURCE(9,IS)                                                 S0303270
      HB = SOURCE(11,IS)                                                S0303280
      HW = SOURCE(12,IS)                                                S0303290
      D = SOURCE(10,IS)                                                 S0303300
      TS = SOURCE(8,IS)                                                 S0303310
      NSO = SOURCE(2,IS)                                                S0303320
      IWAK = ITYPE/8192                                                 S0303330
      QFLG = ITYPE/512 - (ITYPE/8192)*16                                S0303340
      NVS = ITYPE/16 - (ITYPE/512)*32                                   S0303350
      ITYPE = ITYPE - (ITYPE/16)*16                                     S0303360
      XY = SOURCE(ISTUM2+75,IS)                                         S0303370
      FZERO = .FALSE.                                                   S0303380
      XMAX = 0.0                                                        S0303390
C     RETRIEVE SOURCE EMISSIONS RATE (IF ANY).                          S0303400
      QTK = 1.0                                                         S0303410
      IF(QFLG .LE. 0 .AND. QFLGS .LE. 0) GOTO 640                       S0303420
      I1 = IS                                                           S0303430
      IF(QFLGS .LE. 0) GOTO 580                                         S0303440
      I1 = 1                                                            S0303450
      QFLG = QFLGS                                                      S0303460
  580 I2 = ISEA                                                         S0303470
      GOTO (630,590 ,600 ,610 ,620 ) ,QFLG                              S0303480
  590 I2 = IMO                                                          S0303490
      GOTO 630                                                          S0303500
  600 I2 = IHR                                                          S0303510
      GOTO 630                                                          S0303520
  610 I2 = (IST-1)*6 + ISP                                              S0303530
      GOTO 630                                                          S0303540
  620 I2 = (ISEA - 1)*24 + IHR                                          S030355(
  630 QTK = SOURCE(I2+119,I1)                                           S0303560
  640 QTK = SOURCE(3,IS)*TK*QTK                                         S0303570
C     CALCULATE EFFECTIVE WIND SPEED.                                   S0303580
      UBARS = UBAR                                                      S0303590
      IF(PP) 670,670,650                                                S0303600
  650 IF(HS) 670,670,660                                                S0303610
C     NOTE:   ZR IS IN RECIPROCAL FORM.                                 S0303620
  660 A1 = HS                                                           S0303630
      IF(HS .LT. 10.0) A1 = AMIN1(10.0,1./ZR)                           S0303640
      UBARS = UBAR*(A1*ZR)**PP                                          S0303650
  670 UBARI = 1./UBARS                                                  S0303660
C     BEGIN PLUME RISE CALCULATIONS FOR STACK-TYPE SOURCES.             S0303670
      IF(ITYPE-1) 680,840,840                                           S0303680
  680 WAKE = .FALSE.                                                    S0303690
      IF(VS) 690,690,700                                                S0303700
C     CHECK FOR DOWNWASH STACK HEIGHT ADJUSTMENT, VS = 0.               S0303710
  690 IF(ISW(25) .EQ. 2) HS = HS -3.*D                                  S0303720
C     IF EXIT VELOCITY, VS, EQUALS 0 THEN DHA = 0.                      S0303730
      DHAWAK = HS                                                       S0303740
      IF(HS .LT. 2.5*HB .AND. HS .LT. HB+1.5*HW) WAKE = .TRUE.          S0303750
      GOTO 840                                                          S0303760
  700 VSD = VS*D                                                        S0303770
C     CHECK FOR DOWNWASH STACK HEIGHT ADJUSTMENT, VS > 0.               S0303780
      IF(ISW(25) .EQ. 2 .AND. VS .LT. 1.5*UBARS) HS = HS + (VS*UBARI    S0303790
     1 -1.5)*(D+D)                                                      S0303800
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      GAMJI = 1./(.33333333+UBARS/VS)                                   S0303810
      GAMJI = GAMJI*GAMJI                                               S0303820
      IF(DTH .LE. 0.0) GOTO 710                                         S0303830
      S = 9.8*DTH/TA                                                    S0303840
      SI = 1./S                                                         S0303850
      SS = SQRT(S)                                                      S0303860
      SSI = 1./SS                                                       S0303870
  710 IF(TS-TA) 730,730,720                                             S0303880
C     IF SOURCE TEMPERATURE = 0, SET EQUAL TO AMBIENT AIR TEMP.         S0303890
  720 IF(TS) 730,730,740                                                S0303900
  730 FM = VSD*VSD*.25                                                  S0303910
      F = 0.0                                                           S0303920
      FZERO = .TRUE.                                                    S0303930
      GOTO 770                                                          S0303940
  740 TOT = TA/TS                                                       S0303950
      FM = TOT*VSD*VSD*.25                                              S0303960
      F = 2.45*VSD*D*(1.-TOT)                                           S0303970
      IF(F .GT. 55.0) GOTO 750                                          S0303980
      FC = .0727*VSD**1.3333333                                         S0303990
      GOTO 760                                                          S0304000
  750 FC = .0141*VSD**1.6666667                                         S0304010
  760 IF(F .GT. FC) GOTO 770                                            S0304020
      FZERO = .TRUE.                                                    S0304030
      F = 0.0                                                           S0304040
  770 IF(HB .LE. 0.0) GOTO 800                                          S0304050
      IF(DTH .GT. 0.0) GOTO 780                                         S0304060
C     TEST FOR WAKE EFFECTS.                                            S0304070
      DHA = 3.*FM*(HB+HB)*GAMJI*UBARI*UBARI                             S0304080
      DHAWAK = DHA**.33333333                                           S0304090
      GOTO 790                                                          S0304100
  780 DHA = 3.*FM*GAMJI*UBARI*SSI*SIN(SS*(HB+HB)*UBARI)                 S0304110
      DHAWAK = DHA**.33333333                                           S0304120
      DHA1 = 3.*VSD*UBARI                                               S0304130
      IF(DHAWAK .GT. DHA1) DHAWAK = DHA1                                S0304140
  790 DHAWAK = HS + DHAWAK                                              S0304150
      IF(DHAWAK.LT.2.5*HB .AND. DHAWAK.LT.HB+1.5*HW) WAKE = .TRUE.      S0304160
C     CALCULATE XPLUME.                                                 S0304170
  800 IF(DTH .GT. 0.0) GOTO 830                                         S0304180
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      IF(FZERO) GOTO 820                                                S0304190
      IF(F .GT. 55.0) GOTO 810                                          S0304200
      XPLUME = 49.*F**.625                                              S0304210
      GOTO 840                                                          S0304220
  810 XPLUME = 119.*F**.4                                               S0304230
      GOTO 840                                                          S0304240
  820 XPLUME = 4.*D*UBARI*(VS+3.*UBARS)**2/VS                           S0304250
      GOTO 840                                                          S0304260
  830 XPLUME = 1.570796327*UBARS*SSI                                    S0304270
      IF(.NOT.FZERO) XPLUME = XPLUME + XPLUME                           S0304280
  840 CONTINUE                                                          S0304290
C     CHECK FOR FINAL PLUME RISE OPTION.                                S0304300
      IF(.NOT.ISW24) GOTO 880                                           S0304310
      IF(DTH .GT. 0.0) GOTO 850                                         S0304320
      DHA = 3.*FM*XPLUME*GAMJI*UBARI*UBARI                              S0304330
      IF(.NOT.FZERO) DHA = DHA + 1.5*F*XPLUME*XPLUME*GAM1I*UBARI**3     S0304340
      GOTO 870                                                          S0304350
  850 IF(FZERO) GOTO 860                                                S0304360
      DHA = 6.*F*GAM2I*UBARI*SI                                         S0304370
      GOTO 870                                                          S0304380
  860 DHA = 3.*FM*GAMJI*UBARI*SSI                                       S0304390
  870 DHA = DHA**.33333333                                              S0304400
  880 CONTINUE                                                          S0304410
C                                                                       S0304420
C***  BEGIN LOOP OVER RECEPTOR POINTS.                                  S0304430
C                                                                       S0304440
      IF(NXPNTS .NE. 0 .AND. NYPNTS .NE. 0) GOTO 900                    S0304450
  890 IF(NXWYPT .EQ. 0) GOTO 1400                                       S0304460
      GOTO 910                                                          S0304470
  900 J = 0                                                             S0304480
      POLAR = .FALSE.                                                   S0304490
      IF(ISW(2) .EQ. 2 .OR. ISW(2) .EQ. 4) POLAR = .TRUE.               S0304500
      NEXTR = 1                                                         S0304510
      GOTO 920                                                          S0304520
  910 I = 0                                                             S0304530
      NEXTR = 3                                                         S0304540
      POLAR = .FALSE.                                                   S0304550
      IF(ISW(3) .EQ. 2) POLAR = .TRUE.                                  S0304560
      920 CONTINUE                                                    S0304570
          IF(NEXTR-2) 930,950,970                                     S0304580
      930 J = J + 1                                                   S0304590
          IF(J. GT. NYPNTS) GOTO 890                                  S0304600
          YR = GRIDY(J)                                               S0304610
          IF(.NOT.POLAR) GOTO 940                                     S0304620
C         CHECK IF RECEPTOR IS UPWIND OF SOURCE (POLAR COORD.).       S0304630
          CALL UPWIND(YR,FVR,SINNUM,COSNUM,YRS,YRC,JFLAG)             S0304640
          IF(JFLAG .GT. 0) GOTO 920                                   S0304650
      940 IJ = (J-1)*NXPNTS                                           S0304660
          I = 0                                                       S0304670
          NEXTR = 2                                                   S0304680
      950 I = I + 1                                                   S0304690
          IF(I .LE. NXPNTS) GOTO 960                                  S0304700
          NEXTR = 1                                                   S0304710
          GOTO 920                                                    S0304720
      960 IJ = IJ + 1                                                 S0304730
          XR = GRIDX(I)                                               S0304740
          GOTO 990                                                    S0304750
      970 I = I + 1                                                   S0304760
          IF(I .GT. NXWYPT) GOTO 1400                                 S0304770
          YR = YDIS(I)                                                S0304780
          IF(.NOT.POLAR) GOTO 980                                     S0304790
C         CHECK IF DISCRETE RECEPTOR POINT IS UPWIND OF SOURCE (POLAR COORD)S0304800
          CALL UPWIND(YR,FVR,SINNUM,COSNUM,YRS,YRC,JFLAG)             S0304810
          IF(JFLAG .GT. 0) GOTO 920                                   S0304820
      980 IJ = NXPNTS*NYPNTS + I                                      S0304830
          XR = XDIS(I)                                                S0304840
      990 CONTINUE                                                    S0304850
          IF(POLAR) GOTO 1000                                         S0304860
          XR1 = XR -XS                                                S0304870
          YR1 = YR - YS                                               S0304880
          GOTO 1010                                                   S0304890
     1000 XR1 = XR*YRS - XS                                           S0304900
          YR1 = XR*YRC - YS                                           S0304910
C         CHECK IF TERRAIN ELEVATION IS LOWER THAN STACK HEIGHT.      S0304920
     1010 IF(ISW(4).NE.1.OR.HS+ZS-GRIDZ(IJ).GT.0.0) GOTO 1020         S0304930
          IF(LINE .EQ. 0) WRITE(IO,9011)                              S0304940
      WRITE(IO,9012) HSO,XR,YR                                          S0304950
      STOP                                                              S0304960
C     CALCULATE DOWNWIND DISTANCE, XBAR.                                S0304970
 1020 XBAR = -(XR1*FVRSIN + YR1*FVRCOS)                                 S0304980
      IF(XBAR .LE. 0.0) GOTO 920                                        S0304990
      IF(XMAX .LE. 0.0) GOTO 1030                                       S0305000
      IF(XBAR .GT. XMAX .AND. ISW(4) .EQ. 0) GOTO 920                   S0305010
C     CALCULATE CROSSWIND DISTANCE.                                     S0305020
 1030 YBAR = XR1*FVRCOS - YR1*FVRSIN                                    S0305030
      XOP = 0.0                                                         S0305040
C     1./SQRT(3.14159265) = .5641896  (CALCULATE EFFECTIVE RADIUS.)     S0305050
      IF(ITYPE .EQ. 2) XOP = .5641896*XO                                S0305060
      IF(ITYPE .EQ. 1) XOP = 2.15*SIGYO                                 S0305070
      A1 = 3.*HB                                                        S0305080
      IF(HW .LT. HB) A1 = 3.*HW                                         S0305090
      IF(A1 .LT. 99.99) A1 = 99.99                                      S0305100
      IF((XBAR-XOP) .LT. 0.0) GOTO 920                                  S0305110
      A2 = SQRT(XBAR*XBAR + YBAR*YBAR) - XOP                            S0305120
      IF(A2 .LT. A1) GOTO 920                                           S0305130
      YP = XBAR*1.19175359                                              S0305140
      IF(YBAR .GT. YP) GOTO 920                                         S0305150
C     ADJUST XBAR TO DOWNWIND EDGE OF AREA SOURCE.                      S0305160
      IF(ITYPE .EQ. 2) XBAR = XBAR - XOP                                S0305170
C     RESUME PLUME RISE CALCULATIONS.                                   S0305180
      H = HS                                                            S0305190
      IF(ITYPE .GT. 0) GOTO 1100                                        S0305200
      IF(ISW24) GOTO 1090                                               S0305210
      IF(VS .LE. 0.0) GOTO 1100                                         S0305220
      IF(DTH .GT. 0.0) GOTO 1040                                        S0305230
      XP = XPLUME                                                       S0305240
      IF(XBAR .LT. XPLUME) XP = XBAR                                    S0305250
      DHA = 3.*FM*XP*UBARI*UBARI*GAMJI                                  S0305260
      IF(.NOT.FZERO) DHA = DHA + 1.5*F*XP*XP*GAM1I*UBARI**3             S0305270
      GOTO 1060                                                         S0305280
 1040 IF(FZERO) GOTO 1070                                               S0305290
      IF(XBAR .LT. XPLUME) GOTO 1050                                    S0305300
      DHA = 6.*F*GAM2I*UBARI*SI                                         S0305310
      GOTO 1060                                                         S0305320
 1050 XP1 = SS*XBAR*UBARI                                                S0305330
      DHA = 3.*FM*GAMJI*UBARI*SSI*SIN(XP1) + 3.*F*GAM2I*UBARI*SI*        S0305340
     1      (1.-COS(XP1))                                                S0305350
 1060 DHA = DHA**.33333333                                               S0305360
      GOTO 1090                                                          S0305370
 1070 DHA = 3.*FM*GAMJI*UBARI*SSI                                        S0305380
      IF(XBAR .GE. XPLUME) GOTO 1080                                     S0305390
      XP1 = SS*XBAR*UBARI                                                S0305400
      DHA = DHA*SIN(XP1)                                                 S0305410
 1080 DHA = DHA**.33333333                                               S0305420
      DHA1 = 3.*VSD*UBARI                                                S0305430
      IF(DHA .GT. DHA1) DHA = DHA1                                       S0305440
C     EFFECTIVE PLUME HEIGHT.                                            S0305450
 1090 H = HS + DHA                                                       S0305460
C     ADJUST H DUE TO TERRAIN                                            S0305470
      IF(ISW(4) .NE. 1 .OR. ISW(1) .NE. 1 .OR. NVS .NE. 0) GOTO 1100     S0305480
      A1 = ZS - GRIDZ(IJ)                                                S0305490
      IF(A1 .GT. 0.0) GOTO 1100                                          S0305500
      H = H + A1                                                         S0305510
 1100 CONTINUE                                                           S0305520
      IF(H .LE. HM) GOTO 1110                                            S0305530
      XMAX = XBAR                                                        S0305540
C     IF POLAR & NEXTR=2 & NO TERRAIN, SKIP RINGS FOR THIS RADIAL.       S0305550
      IF(.NOT.POLAR .OR. NEXTR .NE. 2 .OR. ISW(4) .NE. 0) GOTO 920       S0305560
      NEXTR = 1                                                          S0305570
      GOTO 920                                                           S0305580
 1110 XBARK = .001*XBAR                                                  S0305590
      XBARY = XBARK                                                      S0305600
      XBARZ = XBARK                                                      S0305610
C     CALL SIGMAZ TO COMPUTE EFFECTIVE DOWNWIND DISTANCE INDEX, IXDIST.  S0305620
      I1 = 3                                                             S0305630
      IF(ITYPE .EQ. 0 .AND. .NOT.WAKE) I1 = 4                            S0305640
      CALL SIGMAZ(XBARK,SIGZ,BBAR,ISTUM2,IXDIST,I1,SASIGZ,SBSIGZ,        S0305650
     1 SOURCE(82,IS))                                                    S0305660
C     CALCULATE LATERAL AND VERTICAL SIGMAS.                             S0305670
      SGZDON = .FALSE.                                                   S0305680
      IF(ITYPE .GT. 0) GOTO 1130                                         S0305690
 1120 IF(.NOT.WAKE) GOTO 1190                                            S0305700
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      A1 = HB                                                           S0305710
      IF(HW .LT. HB) A1 = HW                                            S0305720
      IF(XBAR .GE. 10.*A1) GOTO 1130                                    S0305730
      SGZDON = .TRUE.                                                   S0305740
      SIGZ = .7*A1 + .067*(XBAR-3.*A1)                                  S0305750
      IF(ISTUM2 .GT. 2) GOTO 1140                                       S0305760
      A3 = XBARK + SOURCE(IXDIST+81,IS)                                 S0305770
      CALL SIGMAZ(A3,A2,BBAR,ISTUM2,IXDIST,1,SASIGZ,SBSIGZ,DUMMY)       S0305780
      SIGZ = AMAX1(SIGZ,A2)                                             S0305790
      GOTO 1140                                                         S0305800
 1130 XBARZ = XBARK + SOURCE(IXDIST+81,IS)                              S0305810
 1i40 IF(ITYPE .GT. 0) GOTO 1180                                        S0305820
      IF(DHAWAK .GT. 1.2*HB) GOTO 1190                                  S0305830
      IF(XBAR .GE. 10.*A1) GOTO 1180                                    S0305840
      IF(HW .LE. 5.*HB) GOTO 1160                                       S0305850
      IF(IWAK .EQ. 1) GOTO 1i50                                         S0305860
      SIGY = .35*HB + .067*(XBAR-3.*HB)                                 S0305870
      GOTO 1170                                                         S0305880
 1150 SIGY = 1.75*HB + .067*(XBAR - 3.*HB)                              S0305890
      GOTO 1170                                                         S0305900
 1160 SIGY = .35*HW + .067*(XBAR - 3.*A1)                               S0305910
 1170 IF(ISTUM2 .GT. 2) GOTO 1200                                       S0305920
      A3 = XBARK + XY                                                   S0305930
      TH = .017453293*(SC(ISTUM2)-SD(ISTUM2)*ALOG(A3))                  S0305940
      A2 = 465.11628*A3*TAN(TH)                                         S0305950
      SIGY = AMAX1(SIGY,A2)                                             S0305960
      GOTO 1200                                                         S0305970
 1180 XBARY = XBARK + XY                                                S0305980
 1190 TH = .017453293*(SC(ISTUM2)-SD(ISTUM2)*ALOG(XBARY))               S0305990
      SIGY = 465.!1628*XBARY*TAN(TH)                                    S0306000
 1200 SIGYI = 1./SIGY                                                   S0306010
      IF(ITYPE .EQ. 2) GOTO 1210                                        S0306020
      A1 = .5*(YBAR*SIGYI)**2                                           S0306030
      IF(A1 .GT. 50.0) GOTO 920                                         S0306040
 1210 IF(SGZDON) GOTO 1220                                              S0306050
      CALL SIGMAZ(XBARZ,SIGZ,BBAR,ISTUM2,IXDIST,1,SASIGZ,SBSIGZ,DUMMY)  S0306060
      IF(SIGZ .GT. 5000. .AND. NVS .EQ. 0) SIGZ = 5000.                 S0306070
 1220 SIGZI = 1./SIGZ                                                   S0306080
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C     CALCULATE DECAY TERM.                                              S0306090
      XBARU = XBAR*UBARI                                                 S0306100
      DECAYT = 1.0                                                       S0306110
      IF(DECAY(IHR) .GT. 0.0) DECAYT = EXP(-DECAY(IHR)*XBARU)            S0306120
C     CHECK CONCENTRATION-DEPOSITION SWITCH.                             S0306130
      IF(ISW(1) .EQ. 2) GOTO 1320                                        S0306140
C     CONCENTRATION EQUATION.                                            S0306150
C     CHECK FOR PARTICULATES WITH SETTLING VELOCITIES.                   S0306160
      IF(NVS .GT. 0) GOTO 1260                                           S0306170
      IF(SIGZ*HMI .LT. 1.6) GOTO 1240                                    S0306180
C     CALCULATE 'BOX-MODEL' CONCENTRATION                                S0306190
      IF(ITYPE .EQ. 2) GOTO 1230                                         S0306200
      CHI = QTK*UBARI*SIGYI*HMI*EXP(-A1)*DECAYT*.39894228                S0306210
      GOTO 1390                                                          S0306220
 1230 A3 = .70710678*SIGYI                                               S0306230
      A4 = (XOP+YBAR)*A3                                                 S0306240
      A5 = -(XOP-YBAR)*A3                                                S0306250
      A3 = ERFX(A4,A5)                                                   S0306260
      CHI = QTK*XO*HMI*UBARI*A3*.5*DECAYT                                S0306270
      GOTO 1390                                                          S0306280
C     CALCULATE VERTICAL TERM FOR ALL SOURCE TYPES W/O PARTICLE          S0306290
C     SETTLING VELOCITIES.                                               S0306300
 1240 V = 0.0                                                            S0306310
      A2 = 0.0                                                           S0306320
 1250 VL = V                                                             S0306330
      A2 = A2 + 2.0                                                      S0306340
      HMA2 = A2*HM                                                       S0306350
      A3 = (HMA2-H)*SIGZI                                                S0306360
      A4 = (HMA2+H)*SIGZI                                                S0306370
      A3 = -.5*A3*A3                                                     S0306380
      A4 = -.5*A4*A4                                                     S0306390
      A5 = 0.0                                                           S0306400
      IF(A3 .GT. -50.) A5 = EXP(A3)                                      S0306410
      A6 = 0.0                                                           S0306420
      IF(A4 .GT. -50.) A6 = EXP(A4)                                      S0306430
      V = V + A5 + A6                                                    S0306440
      IF(ABS(V-VL) .GT. 1.E-8) GOTO 1250                                 S0306450
      A2 = H*SIGZI                                                       S0306460
      V = EXP(-.5*A2*A2) + V                                            S0306470
      GOTO 1300                                                         S0306480
C     CALCULATE VERTICAL TERM FOR ALL SOURCE TYPES WITH SETTLING        S0306490
C     VELOCITIES.                                                       S0306500
 1260 V = 0.0                                                           S0306510
      SUM = 0.0                                                         S0306520
      SUM1 = 0.0                                                        S0306530
      DO 1290 K = 1,NVS                                                 S0306540
      JP70 = K + 35                                                     S0306550
      XBARUV = SOURCE(JP70,IS)*XBARU                                    S0306560
      JP70 = K + 55                                                     S0306570
      GAMMA = SOURCE(JP70,IS)                                           S0306580
      JP70 = K + 15                                                     S0306590
      PHI = SOURCE(JP70,IS)                                             S0306600
      A2 = 0.0                                                          S0306610
      A3 = (-H+XBARUV)*SIGZI                                            S0306620
      A5 = -.5*A3*A3                                                    S0306630
      IF(A5 .GT. -50.) SUM = EXP(A5)                                    S0306640
      IF(GAMMA .LE. 0.0) GOTO 1270                                      S0306650
      A4 = (H - XBARUV)*SIGZI                                           S0306660
      A5 = -.5*A4*A4                                                    S0306670
      IF(A5 .GT. -50.) SUM = SUM + EXP(A5)*GAMMA                        S0306680
      CALL VERT(H,HM,XBARUV,SIGZI,GAMMA,A2,SUM)                         S0306690
 1270 A2 = 2.0                                                          S0306700
      A3 = (HM+HM-H+XBARUV)*SIGZI                                       S0306710
      A5 = -.5*A3*A3                                                    S0306720
      IF(A5 .GT. -50.) SUM1 = EXP(A5)                                   S0306730
      IF(GAMMA .LE. 0.0) GOTO 1280                                      S0306740
      A4 = (HM+HM+H-XBARUV)*SIGZI                                       S0306750
      A5 = -.5*A4*A4                                                    S0306760
      IF(A5 .GT. -50.) SUM1 = SUM1 + EXP(A5)*GAMMA                      S0306770
      CALL VERT(H,HM,XBARUV,SIGZI,GAMMA,A2,SUM1)                        S0306780
 1280 V = V + .5*PHI*(SUM+SUM1)                                         S0306790
 1290 CONTINUE                                                          S0306800
C     CALCULATE CONCENTRATON FOR ALL SOURCE TYPES WITH VERTICAL TERM.   S0306810
 1300 IF(ITYPE .EQ. 2) GOTO 1310                                        S0306820
      CHI = QTK*UBARI*SIGYI*SIGZI*EXP(-A1)*V*DECAYT*.31830989           S0306830
      GOTO 1390                                                         S0306840
 1310 A3 = .70710678*SIGYI                                              S0306850
      A4 = (XOP+YBAR)*A3                                                S0306860
      A5 = -(XOP-YBAR)*A3                                               S0306870
      A3 = ERFX(A4,A5)                                                  S0306880
      CHI = QTK*XO*SIGZI*UBARI*V*DECAYT*A3*.39894228                    S0306890
      GOTO 1390                                                         S0306900
C     BEGIN DEPOSITION CALCULATIONS.                                    S0306910
 1320 IF(NVS .GT. 0) GOTO 1330                                          S0306920
      IF(LINE .EQ. 0) WRITE(IO,9011)                                    S0306930
      WRITE(IO,9013) NSO                                                S0306940
      STOP                                                              S0306950
C     CALL SIGMAZ TO COMPUTE AVERAGE EFFECTIVE DOWNWIND DISTANCE, BBAR. S0306960
 1330 CALL SIGMAZ(XBARZ,SIGZ,BBAR,ISTUM2,IXDIST,2,SASIGZ,SBSIGZ,DUMMY)  S0306970
      V = 0.0                                                           S0306980
      DO 1370 K = 1,NVS                                                 S0306990
      JP70 = K + 55                                                     S0307000
      GAMMA = SOURCE(JP70,IS)                                           S0307010
      JP70 = K + 15                                                     S0307020
      PHI = SOURCE(JP70,IS)                                             S0307030
      JP70 = K + 35                                                     S0307040
      XBARUV = XBARU*SOURCE(JP70,IS)                                    S0307050
      A5 = (1.-BBAR)*XBARUV                                             S0307060
      GAM1 = 1.0                                                        S0307070
      GAM2 = GAMMA                                                      S0307080
      A2 = 0.0                                                          S0307090
      SUM = 0.0                                                         S0307100
 1340 SUML = SUM                                                        S0307110
      A2 = A2 + 2.                                                      S0307120
      HMA2 = A2*HM                                                      S0307130
      A3 = (HMA2-H+XBARUV)*SIGZI                                        S0307140
      A6 = 0.0                                                          S0307150
      A3 = -.5*A3*A3                                                    S0307160
      IF(A3 .GT. -50.) A6 = EXP(A3)*GAM1*(BBAR*(HMA2-H)-A5)             S0307170
      IF(GAMMA .GT. 0.0) GOTO 1350                                      S0307180
      SUM = A6                                                          S0307190
      GOTO 1360                                                         S0307200
 1350 A4 = (HMA2+H-XBARUV)*SIGZI                                        S0307210
      A7 = 0.0                                                          S0307220
      A4 = -.5*A4*A4                                                    S0307230
      IF(A4 .GT. -50.) A7 = EXP(A4)*GAM2*(BBAR*(HMA2+H)+A5)             S0307240
      SUM = SUM + A6 + A7                                               S0307250
      IF(ABS(SUM-SUML) .LT. 1.E-8) GOTO 1360                            S0307260
      GAM1 = GAM2                                                       S0307270
      GAM2 = GAM2*GAMMA                                                 S0307280
      GOTO 1340                                                         S0307290
 1360 A3 = (H-XBARUV)*SIGZI                                             S0307300
      A7 = -.5*A3*A3                                                    S0307310
      A3 = 0.0                                                          S0307320
      IF(A7 .GT. -50.) A3 = (BBAR*H + A5)*EXP(A7)                       S0307330
      V = V + (1.-GAMMA)*PHI*(A3 + SUM)                                 S0307340
 1370 CONTINUE                                                          S0307350
C     FINISH DEPOSITION CALCULATIONS.                                   S0307360
      IF(ITYPE .EQ. 2) GOTO 1380                                        S0307370
      CHI = QTK*SIGYI*SIGZI/XBAR*EXP(-A1)*DECAYT*V*.15915494            S0307380
 1380 CHI = QTK*X0*SIGZI/XBAR*DECAYT*V*ERFX((XOP+YBAR)*SIGYI*.70710678  S0307390
     1 ,-(XOP-YBAR)*SIGYI*.70710678)*.39894228                          S0307400
C     STORE CONCENTRATION OR DEPOSITION INTO CALC ARRAY.  GO GET        S0307410
C     NEXT RECEPTOR.                                                    S0307420
 1390 CALC(IJ) = CHI                                                    S0307430
      IJP = IJ + NPNTS                                                  S0307440
      CALC(IJP) = CALC(IJP) + CHI                                       S0307450
      GOTO 920                                                          S0307460
 1400 CONTINUE                                                          S0307470
      IF(NGROUP .EQ. 0) GOTO 1480                                       S0307480
      NSUM = 0                                                          S0307490
      DO 1470 IG = 1,NGROUP                                             S0307500
      NS = NSOGRP(IG)                                                   S0307510
      DO 1460 N = 1,NS                                                  S0307520
      NNSO = IDSOR(NSUM+1)                                              S0307530
      IF(NNSO .GT. 0) GOTO 1410                                         S0307540
      NNSO = -NNSO                                                      S0307550
      MNSO = IDSOR(NSUM) + 1                                            S0307560
      IF(NSO .LT. MNSO .OR. NSO .GT. NNSO) GOTO 1460                    S0307570
      GOTO 1420                                                         S0307580
 1410 IF(NNSO .NE. NSO) GOTO 1460                                       S0307590
C     LOAD THIS SOURCE CHI INTO APPROPRIATE CHIAV ARRAYS.               S0307600
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Go To 1390

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 1420 IAVG = 0                                                          S0307610
      DO 1440 I = 1,8                                                   S0307620
      IF(ISW(I+6) .NE. 1) GOTO 1440                                     S0307630
      I1 = NPNTS*((IG-1)*NAVG + IAVG)                                   S0307640
      IAVG = IAVG + 1                                                   S0307650
      DO 1430 J = 1,NPNTS                                               S0307660
      IP7 = I1 + J                                                      S0307670
 1430 CHIAV(IP7) = CHIAV(IP7) + CALC(J)                                 S0307680
 1440 CONTINUE                                                          S0307690
      IF(ISW(15) .NE. 1) GOTO 1460                                      S0307700
C     LOAD SOURCE CHI FOR ANNUAL TABLE FOR THIS SOURCE GROUP.           S0307710
      I2 = (IG-1)*NPNTS                                                 S0307720
      DO 1450 J = 1,NPNTS                                               S0307730
      IP7 = I2 + J                                                      S0307740
 1450 CHIAN(IP7) = CHIAN(IP7) + CALC(J)                                 S0307750
 1460 NSUM = NSUM + 1                                                   S0307760
 1470 CONTINUE                                                          S0307770
C     GET NEXT SOURCE                                                   S0307780
 1480 CONTINUE                                                          S0307790
 1490 IF(NGROUP .GT. 0) GOTO 1520                                       S0307800
C     LOAD ALL SOURCE CHI'S INTO APPROPRIATE CHIAV ARRAYS.              S0307810
      IAVG = 0                                                          S0307820
      DO 1510 I = 1,8                                                   S0307830
      IF(ISW(I+6) .NE. 1) GOTO 1510                                     S0307840
      IP6 = IAVG*NPNTS                                                  S0307850
      IAVG = IAVG + 1                                                   S0307860
      DO 1500 J = 1,NPNTS                                               S0307870
      I2 = IP6 + J                                                      S0307880
      IP7 = NPNTS + J                                                   S0307890
 1500 CHIAV(I2) = CHIAV(I2) + CALC(IP7)                                 S0307900
 1510 CONTINUE                                                          S0307910
C                                                                       S0307920
C     BEGIN LOOP OVER ALL SOURCE GROUPS.                                S0307930
C                                                                       S0307940
 1520 NSUM = 1                                                          S0307950
      IG = 1                                                            S0307960
      IF(NGROUP .LE. 0) GOTO 1540                                       S0307970
 1530 NS = NSOGRP(IG)                                                   S0307980
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      ITO = NSUM + NS - 1                                               S0307990
C                                                                       S0308000
C     BEGIN LOOP OVER ALL TIME PERIODS FOR THIS HOUR.                   S0308010
C                                                                       S0308020
 1540 IAVG = 0                                                          S0308030
      DO 1640  I = 1,8                                                  S0308040
C     FOR DAILY TABLES COMPUTE AVERAGES, WRITE TO TAPE & PRINT.         S0308050
      IF(ISW(I+6) .NE. 1) GOTO 1640                                     S0308060
      IAVG = IAVG + 1                                                   S0308070
      IF(.NOT.IFLAG(I)) GOTO 1640                                       S0308080
      I1 = NPNTS*((IG-1)*NAVG + IAVG - 1)                               S0308090
      IF(KAVG(I) .EQ. 1.OR. ISW(1) .EQ. 2) GOTO 1560                    S0308100
      A1 = 1./KAVG(I)                                                   S0308110
      DO 1550 J = 1,NPNTS                                               S0308120
      IP7 = I1 + J                                                      S0308130
 1550 CHIAV(IP7) = CHIAV(IP7)*A1                                        S0308140
 1560 IF(ISW(5) .EQ. 1) WRITE(ITAP) IHR,JDY,IG,(CHIAV(I1+J),J=1,NPNTS)  S0308150
      IF(IPERD .GT. 0 .AND. IPERD .NE. IHR/KAVG(I)) GOTO 1570           S0308160
      IF(ISW(16) .NE. 1) GOTO 1570                                      S0308170
      IP7 = I1 + 1                                                      S0308180
      CALL DYOUT(GRIDX,GRIDY,XDIS,YDIS,CHIAV(IP7),KAVG(I),JDY,IHR,1,    S0308190
     1 NSUM,ITO,IG)                                                     S0308200
C     CALCULATE HIGHEST & SECOND HIGHEST TABLES IF DESIRED.             S0308210
 1570 IF(ISW(17) .NE. 1) GOTO 1600                                      S0308220
      NPNTS2 = NPNTS + NPNTS                                            S0308230
      NPNTS3 = NPNTS2 + NPNTS                                           S0308240
      IP4 = 4*I1                                                        S0308250
C     512 = 2**9  SHIFT HOUR VALUE & STORE WITH DAY.                    S0308260
      IHRTS = 512*IHR                                                   S0308270
      DO 1590 J = 1,NPNTS                                               S0308280
      JP4 = IP4 + J                                                     S0308290
      JP5 = I1 + J                                                      S0308300
      JP2 = JP4 + NPNTS2                                                S0308310
      JP3 = JP4 + NPNTS3                                                S0308320
      IF(CHIMAX(JP4) .GE. CHIAV(JP5)) GOTO 1580                         S0308330
      JP1 = JP4 + NPNTS                                                 S0308340
      CHIMAX(JP2) = CHIMAX(JP4)                                         S0308350
      CHIMAX(JP4) = CHIAV(JP5)                                          S0308360
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            CHIMAX(JP3) = CHIMAX(JP1)                                           S0308370
            CHIMAX(JP1) = JDY + IHRT5                                           S0308380
            GOTO 1590                                                           S0308390
       1580 IF(CHIMAX(JP2) .GE. CHIAV(JP5)) GOTO 1590                           S0308400
            CHIMAX(JP2) = CHIAV(JP5)                                            S0308410
            CHIMAX(JP3) = JDY + IHRT5                                           S0308420
       1590 CONTINUE                                                            S0308430
      C     CALCULATE 50 HIGHEST CONCENTRATIONS(DEPOSITIONS).                   S0308440
       1600 IF(ISW(18) .NE. 1) GOTO 1610                                        S0308450
            IP7 = (IG-1)*NAVG                                                   S0308460
            IP6 = I1 + 1                                                        S0308470
            IP7 = IP7 + IAVG                                                    S0308480
            CALL MAX50(CHIAV(IP6),CHI50(1,IP7),IPNT(1,IP7),ICOUNT(IP7),         S0308490
           1  IHR,JDY)                                                          S0308500
      C     CLEAR 'CHIAV' ARRAY FOR THIS SOURCE GROUP & APPROPRIATE TIME        S0308510
      C     PERIOD.                                                             S0308520
       1610 DO 1620 J = 1,NPNTS                                                 S0308530
       1620 CHIAV(I1+J) = 0.0                                                   S0308540
       1630 CONTINUE                                                            S0308550
       1640 CONTINUE                                                            S0308560
            IG = IG + 1                                                         S0308570
            IF(IG .GT. NGROUP) GOTO 1650                                        S0308580
            NSUM = NSUM + NS                                                    S0308590
            GOTO 1530                                                           S0308600
      C     STORE ANNUAL AVERAGE.                                               S0308610
       1650 IF(ISW(15) .NE. 1 .OR. NGROUP .GT. 0) GOTO 1670                     S0308620
            DO 1660 I = 1,NPNTS                                                 S0308630
            IP6 = I + NPNTS                                                     S0308640
       1660 CHIAN(I) = CHIAN(I) + CALC(IP6)                                     S0308650
      C     END HOURLY LOOP.                                                    S0308660
       1670 CONTINUE                                                            S0308670
      C     CLEAR DAILY AVERAGES ARRAY BEFORE GOING TO NEXT DAY.                S0308680
            NPNTS2 = NAVG*NPNTS                                                 S0308690
            IF(NGROUP .GT. 0) NPNTS2 = NPNTS2*NGROUP                            S0308700
            DO 1680 I = 1,NPNTS2                                                S0308710
       1680 CHIAV(I) = 0.0                                                      S0308720
            NTDAY = NTDAY + 1                                                   S0308730
       1690 CONTINUE                                                            S0308740
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C     END OF MET DATA.                                                  S0308750
      NDAYS = NTDAY                                                     S0308760
      NSUM = 1                                                          S0308770
      IG = 1                                                            S0308780
      IF(NGROUP .LE. 0) GOTO 1710                                       S0308790
 1700 NS = NSOGRP(IG)                                                   S0308800
      ITO = NSUM + NS - 1                                               S0308810
C     PRINT 'N'-DAY TABLE                                               S0308820
 1710 IF(ISW(15) .NE. 1) GOTO 1730                                      S0308830
      NHTOT = NTDAY*24                                                  S0308840
      IF(ISW(19) .NE. 1) NHTOT = NDAYS*NHOURS                           S0308850
      HTOT = 1./FLOAT(NHTOT)                                            S0308860
      IF(ISW(1) .EQ. 2) HTOT = 1.0                                      S0308870
      I1 = (IG-1)*NPNTS + 1                                             S0308880
      I2 = I1 + NPNTS - 1                                               S0308890
      DO 1720 I = I1,I2                                                 S0308900
 1720 CHIAN(I) = CHIAN(I)*HTOT                                          S0308910
      CALL DYOUT(GRIDX,GRIDY,XDIS,YDIS,CHIAN(I1),75,IDY,IHR,1,NSUM,ITO, S0308920
     1 IG)                                                              S0308930
      IF(ISW(5) .EQ. 1) WRITE(ITAP) NHOURS,NTDAY,NGROUP,(CHIAN(I),      S0308940
     1 I=I1,I2)                                                         S0308950
C                                                                       S0308960
C     BEGIN LOOP OVER TIME PERIODS.                                     S0308970
 1730 IAVG = 0                                                          S0308980
      DO 1750 I = 1,8                                                   S0308990
      IF(ISW(I+6) .NE. 1) GOTO 1750                                     S0309000
      IAVG = IAVG + 1                                                   S0309010
C     PRINT HIGHEST & SECOND HIGHEST CONCENTRATION(DEPOSITION) TABLES.  S0309020
      IF(ISW(17) .NE. 1) GOTO 1740                                      S0309030
      IP6 = 4*NPNTS*((IG-1)*NAVG + IAVG - 1) + 1                        S0309040
      CALL DYOUT(GRIDX,GRIDY,XDIS,YDIS,CHIMAX(IP6),KAVG(I),IDY,IHR,2,   S0309050
     1 NSUM,ITO,IG)                                                     S0309060
      IP6 = IP6 + NPNTS + NPNTS                                         S0309070
      CALL DYOUT(GRIDX,GRIDY,XDIS,YDIS,CHIMAX(IP6),KAVG(I),IDY,IHR,3,   S0309080
     1 NSUM,ITO,IG)                                                     S0309090
C     PRINT MAXIMUM 50                                                  S0309100
 1740 IF(ISW(18) .NE. 1) GOTO 1750                                      S0309110
      IP6 = (IG-1)*NAVG + IAVG                                          S0309120
      CALL MAXOT(CHI50(1,IP6),GRIDX,GRIDY,XDIS,YDIS,IPNT(1,IP6),        S0309130
     1 ICOUNT(IP6),KAVG(I) NSUM,ITO,IG)                                 S0309140
 1750 CONTINUE                                                          S0309150
      IG = IG + 1                                                       S0309160
      IF(IG .GT. NGROUP) GOTO 1760                                      S0309170
      NSUM = NSUM + NS                                                  S0309180
      GOTO 1700                                                         S0309190
 1760 IF(ISW(5) .NE. 1) GOTO 1770                                       S0309200
      ENDFILE ITAP                                                      S0309210
      ENDFILE ITAP                                                      S0309220
 1770 RETURN                                                            S0309230
 9001 FORMAT(1H1,121X,9HMET. DATA/122X,3HDAY,I4)                        S0309240
 9002 FORMAT(31X,69H* SOURCE-RECEPTOR COMBINATIONS LESS THAN 100 METERS S0309250
     1OR THREE BUILDING/34X,25HHEIGHTS IN DISTANCE.  NO ,6A4,           S0309260
     2 16H IS CALCULATED *///46X,25H- - RECEPTOR LOCATION - -/51X,      S0309270
     3  1HX,8X,10HY (METERS),10X,8HDISTANCE/31X,6HSOURCE,11X,           S0309280
     4 23HOR RANGE   OR DIRECTION,9X,7HBETWEEN/31X,6HNUMBER,11X,        S0309290
     5 21H(METERS)    (DEGREES),11X,8H(METERS)/30X,30(2H- )/)           S0309300
 9003 FORMAT(31X,I5,8X,2F13.1,7X,F10.2)                                 S0309310
 9004 FORMAT(I8,5F8.0,I8,2F8.0)                                         S0309320
 9005 FORMAT(32X,4H*** ,15A4,4H ***//)                                  S0309330
 9006 FORMAT(//68X,10HPOT. TEMP./29X,4HFLOW,7X,15HWIND      MIXING,13X, S0309340
     1 8HGRADIENT,17X,16HWIND        DECAY/28X,16HVECTOR      SPEED,5X, S0309350
     264HHEIGHT     TEMP.   (DEG. K   STABILITY   PROFILE   COEFFICIENS0309360
     3T/20X,92HHOUR   (DEGREES)   (MPS)    (METERS)  (DEG. K)  PER METERS0309370
     4)   CATEGORY   EXPONENT   (PER SEC)/19X,47(2H -)/)                S0309380
 9007 FORMAT(49X,29H* METEOROLOGICAL DATA FOR DAY,I4,2H *)              S0309390
 9008 FORMAT(21X,I2,F11.1,F10.2,F11.1,F9.1,F12.4,I9,F13.4,E15.6)        S0309400
 9009 FORMAT(//47X,6HRANDOM/38X,2(4HFLOW,6X),16H WIND      MIXING,15X,  S0309410
     1 19HINPUT       ADJUSTED/37X,2(6HVECTOR,4X),27H SPEED      HEIGHT S0309420
     2  TEMP.,2(3X,9HSTABILITY)/29X,6HHOUR  ,2(10H (DEGREES)),3X,       S0309430
     3 30H(MPS)    (METERS)  (DEG. K)   ,2(8HCATEGORY,4X)/27X,40(2H -)/)S0309440
 9010 FORMAT(30X,I2,F11.1,F10.1,F10.2,F11.1,F9.1,I9,I12)                S0309450
 9011 FORMAT(1H1)                                                       S0309460
 9012 FORMAT(10X,46H*** ERROR ***  PHYSICAL STACK HEIGHT OF SOURCE,I5/  S0309470
     1 10X,52HIS LOWER THAN THE TERRAIN ELEVATION FOR THE RECEPTOR/10X, S0309480
     1 12HLOCATED AT (,F 9.1,1H,,F 9.1,19H).  RUN TERMINATED.)          S0309490
 9013 FORMAT(10X,25H***ERROR*** SOURCE NUMBER,I6,41H HAS NO GRAVITATIONAS0309500
     1L SETTLING CATEGORIES,/10X,52HWITH WHICH TO CALCULATE DEPOSITION. S0309510
     2 RUN TERMINATED.)                                                  S0309520
      END                                                                S0309530
      SUBROUTINE DYOUT(GRIDX,GRIDY,XDIS,YDIS,CON,IAVG,IDY,IHR,IFLAG,    S0400010
     1 IFR,ITO,IG)                                                      S0400020
C     THIS ROUTINE PRINTS THE DAILY CONCENTRATION (DEPOSITION) FOR A    S0400030
C     GIVEN TIME PERIOD FOR A GIVEN DAY.  THIS ROUTINE ALSO PRINTS   S04S0400040
C     THE HIGHEST OR SECOND HIGHEST TABLES OF CONCENTRATION (DEPOSITION)S0400050
C     FOR A GIVEN AVERAGING TIME.  FINALLY, THIS ROUTINE PRINTS THE     S0400060
C     'N'-DAY TABLE OR PRINTS THE ELEVATION HEIGHTS FOR ALL RECEPTOR    S0400070
C     POINTS.                                                           S0400080
C     IF IAVG = 99, PRINT ELEVATION HEIGHTS.                            S0400090
C     IF IAVG = 75, PRINT 'N'-DAY TABLE.                                S0400100
C     IF IFLAG = 1, PRINT DAILY TABLE.                                  S0400110
C     IF IFLAG = 2, PRINT HIGHEST TABLE.                                S0400120
C     IF IFLAG = 3, PRINT SECOND HIGHEST TABLE.                         S0400130
C                                                                       S0400140
      LOGICAL ONE                                                       S0400150
      DIMENSION GRIDX(1),GRIDY(1),XDIS(1),YDIS(1),CON(1)                S0400160
      DIMENSION IDAY(5),IHOUR(5)                                        S0400170
      COMMON /LOGIX/ ISW(40),NSOURC,NXPNTS,NYPNTS,NXWYPT,NGROUP,        S0400180
     1 NSOGRP(150),IDSOR(200),IPERD,NPNTS,NAVG,NHOURS,NDAYS,NTDAY,LINE, S0400190
     2 IO,IN,TITLE(15),IQUN(3),ICHIUN(7),CONDEP(6),LIMIT,MIMIT          S0400200
C     SET HOUR AVERAGE LABEL.                                           S0400210
      HOUR = 4HHOUR                                                     S0400220
      IF(IAVG .GT. 1) HOUR = 4HPER.                                     S0400230
   10 IF(NXPNTS .EQ. 0 .OR. NYPNTS .EQ. 0) GOTO 190                     S0400240
C     INITIALIZE SUBSCRIPTS & SUBSCRIPT INCREMENTS.                     S0400250
C     MAXIMUM OF 38 LINES OF Y-AXIS DUE TO HEADING.                     S0400260
C     MAXIMUM OF 9 VALUES ACROSS FOR X-AXIS FOR DAILY & ANNUAL TABLES;  S0400270
C     5 VALUES ACROSS FOR HIGHEST & SECOND HIGHEST TABLES.              S0400280
      IXINC = 9                                                         S0400290
      IF(IFLAG .GT. 1) IXINC = 5                                        S0400300
      IX = 1                                                            S0400310
      JX = IXINC                                                        S0400320
      IY = NYPNTS - 38                                                  S0400330
      JY = NYPNTS                                                       S0400340
C     FIND MAXIMUM VALUE FOR RECEPTOR GRID ONLY.                        S0400350
      IF(IAVG .EQ. 99) GOTO 30                                          S0400360
      NN = NXPNTS*NYPNTS                                                S0400370
      CONMAX = 0.0                                                      S0400380
      DO 20  J = 1,NYPNTS                                               S0400390
      L = (J-1)*NXPNTS                                                  S0400400
      DO 20  I = 1,NXPNTS                                               S0400410
      K = L + I                                                         S0400420
      IF(CON(K) .LT. CONMAX) GOTO 20                                    S0400430
      CONMAX = CON(K)                                                   S0400440
      IXP = I                                                           S0400450
      IYP = J                                                           S0400460
   20 CONTINUE                                                          S0400470
      GOTO 40                                                           S0400480
   30 IF(IAVG .NE. 99) GOTO 40                                          S0400490
      WRITE(IO,9001)                                                    S0400500
      WRITE(IO,9010) TITLE                                              S0400510
      WRITE(IO,9011)                                                    S0400520
      WRITE(IO,9009)                                                    S0400530
      GOTO 100                                                          S0400540
   40 IF(IAVG .NE. 75) GOTO 50                                          S0400550
      WRITE(IO,9002) NTDAY                                              S0400560
      WRITE(IO,9003) IG                                                 S0400570
      WRITE(IO,9010) TITLE                                              S0400580
      WRITE(IO,9012) NTDAY,CONDEP,ICHIUN                                S0400590
      GOTO 90                                                           S0400600
   50 IF(IFLAG-2) 60 ,70 ,80                                            S0400610
   60 I1 = IHR/IAVG                                                     S0400620
      WRITE(IO,9004) IDY,IAVG,I1                                        S0400630
      WRITE(IO,9003) IG                                                 S0400640
      WRITE(IO,9010) TITLE                                              S0400650
      WRITE(IO,9013)  IAVG,CONDEP,ICHIUN,IHR,IDY                        S0400660
      GOTO 90                                                           S0400670
   70 WRITE(IO,9005) IAVG                                               S0400680
      WRITE(IO,9003) IG                                                 S0400690
      WRITE(IO,9010) TITLE                                              S0400700
      WRITE(IO,9014)  IAVG,CONDEP,ICHIUN                                S0400710
      GOTO 90                                                           S0400720
   80 WRITE(IO,9006) IAVG                                               S0400730
      WRITE(IO,9003) IG                                                 S0400740
      WRITE(IO,9010) TITLE                                              S0400750
      WRITE(IO,9015)  IAVG,CONDEP,ICHIUN                                S0400760
   90 IF(NGROUP .EQ. 0) WRITE(IO,9007)                                  S0400770
      IF(NGROUP .GT. 0) WRITE(IO,9008) (IDSOR(I),I=IFR,ITO)             S0400780
      WRITE(IO,9009)                                                    S0400790
      WRITE(IO,9016) CONMAX,GRIDX(IXP),GRIDY(IYP)                       S0400800
C     LABEL AXES DEPENDING ON GRID SYSTEM.                              S0400810
  100 IF(ISW(2) .EQ. 2 .OR. ISW(2) .EQ. 4) GOTO 110                     S0400820
      WRITE(IO,9017)                                                    S0400830
      GOTO 120                                                          S0400840
  110 WRITE(IO,9018)                                                    S0400850
C     CHECK NUMBER ACROSS & DOWN THE PAGE.                              S0400860
  120 IF(NXPNTS .LE. JX) JX = NXPNTS                                    S0400870
      IF(IY .LT. 0) IY = 0                                              S0400880
C     PRINT CONCENTRATIONS(DEPOSITIONS) DEPENDING ON TYPE OF TABLE.     S0400890
      IF(IFLAG .GT. 1) GOTO 140                                         S0400900
      IF(ISW(2) .EQ. 1 .OR. ISW(2) .EQ. 3) WRITE(IO,9019) (GRIDX(I),    S0400910
     1 I=IX,JX)                                                         S0400920
      IF(ISW(2) .EQ. 2 .OR. ISW(2) .EQ. 4) WRITE(IO,9020) (GRIDX(I),    S0400930
     1 I=IX,JX)                                                         S0400940
      WRITE(IO,9021)                                                    S0400950
      LINE = JY                                                         S0400960
  130 L = (LINE-1)*NXPNTS                                               S0400970
      WRITE(IO,9022) GRIDY(LINE), (CON(L+I),I=IX,JX)                    S0400980
      LINE = LINE - 1                                                   S0400990
      IF(LINE .LE. IY) GOTO 170                                         S0401000
      GOTO 130                                                          S0401010
  140 IF(ISW(2) .EQ. 1 .OR. ISW(2) .EQ. 3) WRITE(IO,9023) (GRIDX(I),    S0401020
     1 I=IX,JX)                                                         S0401030
      IF(ISW(2) .EQ. 2 .OR. ISW(2) .EQ. 4) WRITE(IO,9024) (GRIDX(I),    S0401040
     1 I=IX,JX)                                                         S0401050
      WRITE(IO,9021)                                                    S0401060
      I1 = JX-IX+1                                                      S0401070
      LINE = JY                                                         S0401080
  150 L = (LINE-1)*NXPNTS                                               S0401090
      DO 160 J = 1,I1                                                   S0401100
      I2 = L + NPNTS + IX + J - 1                                       S0401110
      ICON = CON(I2)                                                    S0401120
      IDAY(J) = ICON - (ICON/512)*512                                   S0401130
C     37000 OCTAL = 15872 DECIMAL AND MASKS IN HOUR.                    S0401140
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  160 IHOUR(J) = ICON/(512*IAVG)                                        S0401150
      WRITE(IO,9025) GRIDY(LINE), (CON(L+IX+I-1),IDAY(I),IHOUR(I),      S0401160
     1 I=1,I1)                                                          S0401170
      LINE = LINE - 1                                                   S0401180
      IF(LINE .GT. IY) GOTO 150                                         S0401190
C     CHECK FOR MULTIPLE PAGE TABLES.                                   S0401200
  170 IF(IY .LE. 0) GOTO 180                                            S0401210
      IY = IY - 38                                                      S0401220
      JY = JY - 38                                                      S0401230
      GOTO 30                                                           S0401240
  180 IF(NXPNTS .LE. JX) GOTO 190                                       S0401250
      IX = IX + IXINC                                                   S0401260
      JX = JX + IXINC                                                   S0401270
      IY = NYPNTS - 38                                                  S0401280
      JY = NYPNTS                                                       S0401290
      GOTO 30                                                           S0401300
  190 IF(NXWYPT .EQ. 0) GOTO 330                                        S0401310
C     PRINT TABLES FOR DISCRETE POINTS.                                 S0401320
      NN = NXPNTS*NYPNTS                                                S0401330
C     SET SUBSCRIPT VALUES & SUBSCRIPT INCREMENTS.                      S0401340
      IXINC = 114                                                       S0401350
      IF(IFLAG .GT. 1) IXINC = 76                                       S0401360
      IX = 1                                                            S0401370
      JX = IXINC                                                        S0401380
      ONE = .FALSE.                                                     S0401390
  200 IF(NXWYPT .GT. JX) GOTO 210                                       S0401400
      JX = NXWYPT                                                       S0401410
      IF((JX/2)*2 .NE. JX) ONE = .TRUE.                                 S0401420
  210 IF(IAVG .NE. 99) GOTO 220                                         S0401430
      WRITE(IO,9001)                                                    S0401440
      WRITE(IO,9010) TITLE                                              S0401450
      WRITE(IO,9011)                                                    S0401460
      GOTO 280                                                          S0401470
  220 IF(IAVG .NE. 75) GOTO 230                                         S0401480
      WRITE(IO,9002) NTDAY                                              S0401490
      WRITE(IO,9003) IG                                                 S0401500
      WRITE(IO,9010) TITLE                                              S0401510
      WRITE(IO,9012) NTDAY,CONDEP,ICHIUN                                S0401520
      GOTO 270                                                          S0401530
  230 IF(IFLAG-2) 240,250,260                                           S0401540
  240 I1 = IHR/IAVG                                                     S0401550
      WRITE(IO,9004) IDY,IAVG,I1                                        S0401560
      WRITE(IO,9003) IG                                                 S0401570
      WRITE(IO,9010) TITLE                                              S0401580
      WRITE(IO,9013) IAVG,CONDEP,ICHIUN,IHR,IDY                         S0401590
      GO TO 270                                                         S0401600
  250 WRITE(IO,9005) IAVG                                               S0401610
      WRITE(IO,9003) IG                                                 S0401620
      WRITE(IO,9010) TITLE                                              S0401630
      WRITE(IO,9014) IAVG,CONDEP,ICHIUN                                 S0401640
      GOTO 270                                                          S0401650
  260 WRITE(IO,9006) IAVG                                               S0401660
      WRITE(IO,9003) IG                                                 S0401670
      WRITE(IO,9010) TITLE                                              S0401680
      WRITE(IO,9015) IAVG,CONDEP,ICHIUN                                 S0401690
  270 IF(NGROUP .EQ. 0) WRITE(IO,9007)                                  S0401700
      IF(NGROUP .GT. 0) WRITE(IO,9008) (IDSOR(I),I=IFR,ITO)             S0401710
  280 WRITE(IO,9026)                                                    S0401720
      IF(IFLAG .GT. 1) GOTO 290                                         S0401730
      IF(ISW(3) .EQ. 1 .OR. ISW(3) .EQ. 3) WRITE(IO,9027) (CONDEP(3),   S0401740
     1 I=1,3)                                                           S0401750
      IF(ISW(3) .EQ. 2 .OR. ISW(3) .EQ. 4) WRITE(IO,9028) (CONDEP(3),   S0401760
     1 I=1,3)                                                           S0401770
      WRITE(IO,9029) (XDIS(I),YDIS(I),CON(I+NN),I=IX,JX)                S0401780
      GOTO 320                                                          S0401790
  290 IF(ISW(3) .EQ. 1 .OR. ISW(3) .EQ. 3) WRITE(IO,9030) (CONDEP(3),   S0401800
     1 HOUR,I=1,2)                                                      S0401810
      IF(ISW(3) .EQ. 2 .OR. ISW(3) .EQ. 4) WRITE(IO,9031) (CONDEP(3),   S0401820
     1 HOUR,I=1,2)                                                      S0401830
      NN1 = NN + NPNTS                                                  S0401840
      DO 310 J = IX,JX,2                                                S0401850
      ICON = CON(NN1+J)                                                 S0401860
      IDAY(1) = ICON - (ICON/512)*512                                   S0401870
      IHOUR(1) = ICON/(512*IAVG)                                        S0401880
      IF(J .EQ. JX .AND. ONE) GOTO 300                                  S0401890
      ICON = CON(NN1+J+1)                                               S0401900
      IDAY(2) = ICON - (ICON/512)*512                                   S0401910
      IHOUR(2) = ICON/(512*IAVG)                                        S0401920
      I1 = J + 1                                                        S0401930
      WRITE(IO,9032) XDIS(J),YDIS(J),CON(NN+J),IDAY(1),IHOUR(1),        S0401940
     1 XDIS(I1),YDIS(I1),CON(NN+I1),IDAY(2),IHOUR(2)                    S0401950
      GOTO 310                                                          S0401960
  300 WRITE(IO,9032) XDIS(J),YDIS(J),CON(NN+J),IDAY(1),IHOUR(1)         S0401970
  310 CONTINUE                                                          S0401980
C     CHECK FOR MULTIPLE PAGE OUTPUT.                                   S0401990
  320 IF(NXWYPT .LE. JX) GOTO 330                                       S0402000
      IX = JX + 1                                                       S0402010
      JX = JX + IXINC                                                   S0402020
      GOTO 200                                                          S0402030
  330 LINE = 0                                                          S0402040
      RETURN                                                            S0402050
 9001 FORMAT(1H1//)                                                     S0402060
 9002 FORMAT(1H1,121X,7H'N'-DAY/122X,I3,5H DAYS)                        S0402070
 9003 FORMAT(122X,7HSGROUP#,I3)                                         S0402080
 9004 FORMAT(1H1,121X,7HDAILY: ,I3/122X,I2,6H-HR/PD,I2)                 S0402090
 9005 FORMAT(1H1,121X,4HHIGH/122X,I2,3H-HR)                             S0402100
 9006 FORMAT(1H1,121X,8H2ND HIGH/122X,I2,3H-HR)                         S0402110
 9007 FORMAT(56X,20H* FROM ALL SOURCES *)                               S0402120
 9008 FORMAT(50X,18H* FROM SOURCES:   ,5(I6,1H,),1H*/5(50X,10(I6,1H,)/))S0402130
 9009 FORMAT(53X,25H* FOR THE RECEPTOR GRID */)                         S0402140
 9010 FORMAT(32X,4H*** ,15A4,4H ***//)                                  S0402150
 9011 FORMAT(/50X,31H* ELEVATION HEIGHTS IN METERS *)                   S0402160
 9012 FORMAT(35X,2H* ,I3,5H-DAY ,5A4,A2,7A4,2H */)                      S0402170
 9013 FORMAT(32X,7H* DAILY,I3,6H-HOUR ,5A4,A2,7A4,2H */49X,             S0402180
     1 18H* ENDING WITH HOUR,I3, 8H FOR DAY,I4,2H *)                    S0402190
 9014 FORMAT(31X,9H* HIGHEST,I3,6H-HOUR ,5A4,A2,7A4,2H *)               S0402200
 9015 FORMAT(27X,16H* SECOND HIGHEST,I3,6H-HOUR ,5A4,A2,7A4,2H *)       S0402210
 9016 FORMAT(28X,22H* MAXIMUM VALUE EQUALS,F13.5,18H AND OCCURRED AT (, S0402220
     1 F10.1,1H,,F10.1,3H) */)                                          S0402230
 9017 FORMAT(13H   Y-AXIS   /,52X,15HX-AXIS (METERS))                   S0402240
 9018 FORMAT(13H  DIRECTION /,52X,14HRANGE (METERS))                    S0402250
 9019 FORMAT(13H  (METERS)  /,9F13.1)                                   S0402260
 9020 FORMAT(13H  (DEGREES) /,9F13.1)                                   S0402270
 9021 FORMAT(64(2H -)/)                                                 S0402280
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      9022 FORMAT(F11.1,2H /,9F13.5)                                         S0402290
      9023 FORMAT(13H  (METERS)  /,6X,5(F13.1,9X))                           S0402300
      9024 FORMAT(13H  (DEGREES) /,6X,5(F13.1,9X))                           S0402310
      9025 FORMAT(F11.1,2H /,5(F13.5,2H (,I3,1H,,I2,1H)))                    S0402320
      9026 FORMAT(48X,36H* FOR THE DISCRETE RECEPTOR POINTS */)              S0402330
      9027 FORMAT(2X,3(18H  - X -       - Y -,9X,A3,1H.,11X)/64(2H -)/)      S0402340
      9028 FORMAT(2X,3(20H - RNG -     - DIR -,5X,A3,1H.,13X)/64(2H -)/)     S0402350
      9029 FORMAT(3(2F11.1,F14.5,6X))                                        S0402360
      9030 FORMAT(13X,2(19H  - X -      - Y - ,7X,A3,7H.     (,4HDAY,,A4,1H),S0402370
          1 11X)/64(2H -)/)                                                  S0402380
      9031 FORMAT(13X,2(3X,19H- RNG -     - DIR -,5X,A3,7H.     (,4HDAY,,A4, S0402390
          1 1H),10X)/64(2H -)/)                                              S0402400
      9032 FORMAT(12X,2(2F11.1,F13.5,3H  (,I3,1H,,I2,2H) ,10X))              S0402410
           END                                                               S0402420
      SUBROUTINE MAXOT(CON,GRIDX,GRIDY,XDIS,YDIS,IPNT,N,IAVG,IFR,ITO,IG)S0500010
C     THIS ROUTINE LISTS THE HIGHEST 50 CONCENTRATIONS (DEPOSITIONS)    S0500020
C     FOR A GIVEN TIME PERIOD.                                          S0500030
C                                                                       S0500040
      DIMENSION CON(1),GRIDX(1),GRIDY(1),XDIS(1),YDIS(1),IPNT(1),N(1)   S0500050
      DIMENSION IHR(2),IDY(2),X(2),Y(2),IR(2),CHI(2)                    S0500060
      COMMON /LOGIX/ ISW(40),NSOURC,NXPNTS,NYPNTS,NXWYPT,NGROUP,        S0500070
     1 NSOGRP(150),IDSOR(200),IPERD,NPNTS,NAVG,NHOURS,NDAYS,NTDAY,LINE, S0500080
     2 IO,IN,TITLE(15),IQUN(3),ICHIUN(7),CONDEP(6)                      S0500090
C                                                                       S0500100
      WRITE(IO,9001) IAVG,IG                                            S0500110
      WRITE(IO,9004) TITLE                                              S0500120
      WRITE(IO,9005) IAVG,CONDEP , ICHIUN                               S0500130
      IF(NGROUP .EQ. 0) WRITE(IO,9002)                                  S0500140
      IF(NGROUP .GT. 0) WRITE(IO,9003) (IDSOR(I),I=IFR,ITO)             S0500150
      HOUR = 4HPER.                                                     S0500160
      IF(IAVG .EQ. 1) HOUR = 4HHOUR                                     S0500170
      WRITE(IO,9006) (CONDEP(3),HOUR,I=1,2)                             S0500180
      N1 = 1                                                            S0500190
      N1 = N(N1)                                                        S0500200
      I2 = (N1+1)/2                                                     S0500210
      NH = NXPNTS*NYPNTS                                                S0500220
      DO 30 I = 1,I2                                                    S0500230
      DO 20 J = 1,2                                                     S0500240
      I1 = I + I2*(J-1)                                                 S0500250
      IF(I1 .GT. N1) GOTO 40                                            S0500260
      IP = IPNT(I1)                                                     S0500270
      IR(J) = I1                                                        S0500280
      CHI(J) = CON(IP)                                                  S0500290
C     OBTAIN HOUR & DAY.                                                S0500300
      IDY(J) = CON(IP+100)                                              S0500310
      IHR(J) = IDY(J)/(512*IAVG)                                        S0500320
      IDY(J) = IDY(J) - (IDY(J)/512)*512                                S0500330
      K = CON(IP+50)                                                    S0500340
C     GET X,Y LOCATION OF RECEPTOR.                                     S0500350
      IF(K .GT. NH) GOTO 10                                             S0500360
      IY = INT((K-1)/NXPNTS+1)                                          S0500370
      IX = K - (IY-1)*NXPNTS                                            S0500380
      X(J) = GRIDX(IX)                                                  S0500390
      Y(J) = GRIDY(IY)                                                  S0500400
      GOTO 20                                                           S0500410
   10 K = K - NN                                                        S0500420
      X(J) = XDIS(K)                                                    S0500430
      Y(J) = YDIS(K)                                                    S0500440
   20 CONTINUE                                                          S0500450
   30 WRITE(IO,9007) (IR(J),CHI(J),IHR(J),IDY(J),X(J),Y(J),J=1,2)       S0500460
      RETURN                                                            S0500470
   40 WRITE(IO,9007)  IR(1),CHI(1),IHR(1),IDY(1),X(1),Y(1)              S0500480
      RETURN                                                            S0500490
 9001 FORMAT(1H1,121X,6HMAX 50/122X,I2,3H-HR/122X,7HSGROUP#,I3)         S0500500
 9002 FORMAT(56X,20H* FROM ALL SOURCES *)                               S0500510
 9003 FORMAT(50X,18H* FROM SOURCES:    ,5(I6,1H,),1H*/5(50X,10(I6,1H,)/))S0500520
 9004 FORMAT(32X,4H*** ,15A4,4H ***//)                                  S0500530
 9005 FORMAT(28X,12H* 50 MAXIMUM,I3,6H-HOUR ,5A4,A2,7A4,2H *//)         S0500540
 9006 FORMAT(//2(44X,1HX,6X,9HY(METERS))/2(44X,2HOR,8X,2HOR,4X)/        S0500550
     3 2(43X,17HRANGE   DIRECTION)/                                     S0500560
     1 2(10X,4HRANK,6X,A3,1H.,6X,A4,26H DAY   (METERS)  (DEGREES))/     S0500570
     2 5X,60(2H- )/)                                                    S0500580
 9007 FORMAT(2(10X,I3,F15.5,2I5,2F11.1))                                S0500590
      END                                                               S0500600
      SUBROUTINE MAX50(CON,CON50,IPNT,ICOUNT,IHR,IDY)                   S0600010
C     THIS ROUTINE HOLDS THE HIGHEST 50 CONCENTRATIONS (DEPOSITIONS).   S0600020
C     FOR A GIVEN TIME PERIOD.                                          S0600030
C                                                                       S0600040
      DIMENSION CON(1),CON50(1),IPNT(1),ICOUNT(1)                       S0600050
      COMMON /LOGIX/ ISW(40),NSOURC,NXPNTS,NYPNTS,NXWYPT,NGROUP,        S0600060
     1 NSOGRP(150),IDSOR(200),IPERD,NPNTS,NAVG,NHOURS,NDAYS,NTDAY,LINE, S0600070
     2 IO,IN,TITLE(15),IQUN(3),ICHIUN(7),CONDEP(6),LIMIT,MIMIT          S0600080
C     SET MAXIMUM NUMBER OF ENTRIES IN TABLE.                           S0600090
      MAX = 50                                                          S0600100
      LL = 1                                                            S0600110
      DO 90  K = 1,NPNTS                                                S0600120
      IF(ICOUNT(LL) .LT. MAX) GOTO 10                                   S0600130
C     CHECK IF VALUE IS LESS THAN LOWEST IN MAXIMUM 50 TABLE.           S0600140
      IP = IPNT(MAX)                                                    S0600150
      IF(CON(K) .LE. CON50(IP)) GOTO 90                                 S0600160
      GOTO 20                                                           S0600170
   10 IF(ICOUNT(LL) .NE. 0) GOTO 20                                     S0600180
      IICNT = 1                                                         S0600190
      GOTO 80                                                           S0600200
   20 I = 1                                                             S0600210
   30 IP = IPNT(I)                                                      S0600220
      IF(CON(K) .GE. CON50(IP)) GOTO 40                                 S0600230
      I = I + 1                                                         S0600240
      IF(I .LE. ICOUNT(LL)) GOTO 30                                     S0600250
C     VALUE IS LESS THAN ALL VALUES IN MAXIMUM 50 TABLE.                S0600260
C     COUNTER, ICOUNT, IS ALWAYS LESS THAN 50 HERE.                     S0600270
      IICNT = ICOUNT(LL) + 1                                            S0600280
      GOTO 80                                                           S0600290
   40 IICNT = ICOUNT(LL) + 1                                            S0600300
      IF(ICOUNT(LL) .NE. MAX) GOTO 50                                   S0600310
      IP = IPNT(MAX)                                                    S0600320
      IICNT = MAX                                                       S0600330
   50 ISTOP = I + 1                                                     S0600340
      IF(ISTOP .GT. IICNT) GOTO 70                                      S0600350
C     SHIFT POINTERS.                                                   S0600360
      II = IICNT                                                        S0600370
   60 IPNT(II) = IPNT(II-1)                                             S0600380
```

```
             II = II - 1                                                S0600390
             IF(II .GE. ISTOP) GOTO 60                                  S0600400
          70 IF(ICOUNT(LL) .EQ. MAX) IICNT = IP                         S0600410
             IPNT(I) = IICNT                                            S0600420
      C      STORE NEW VALUES INTO MAXIMUM 50 TABLE.                    S0600430
          80 CON50(IICNT) = CON(K)                                      S0600440
             CON50(IICNT+MAX) = K                                       S0600450
      C      2**9 = 512 & SHIFTS HOUR 9 BITS.                           S0600460
             I1 = IDY + 512*IHR                                         S0600470
             CON50(IICNT+MAX+MAX) = I1                                  S0600480
             IF(ICOUNT(LL) .LT. MAX) ICOUNT(LL) = ICOUNT(LL) + 1        S0600490
          90 CONTINUE                                                   S0600500
             RETURN                                                     S0600510
             END                                                        S0600520
      SUBROUTINE VERT(H,HM,XB,SIGZI,GAM,A2,RESULT)                      S0700010
C     THIS ROUTINE COMPILES THE SUMMATION TERM IN THE VERTICAL TERM FOR S0700020
C     GRAVITATIONAL SETTLING CATEGORIES.                                S0700030
C                                                                       S0700040
      SUM = 0.0                                                         S0700050
      GAM1 = GAM                                                        S0700060
      GAM2 = GAM*GAM                                                    S0700070
   10 A5 = 0.0                                                          S0700080
      A6 = 0.0                                                          S0700090
      A2 = A2 + 2.                                                      S0700100
      SUML = SUM                                                        S0700110
      HMA2 = HM*A2                                                      S0700120
      A3 = (HMA2 - H + XB)*SIGZI                                        S0700130
      A3 = -.5*A3*A3                                                    S0700140
      IF(A3 .GT. -50.) A5 = EXP(A3)*GAM1                                S0700150
      A4 = (HMA2 + H - XB)*SIGZI                                        S0700160
      A4 = -.5*A4*A4                                                    S0700170
      IF(A4 .GT. -50.) A6 = EXP(A4)*GAM2                                S0700180
      SUM = SUM + A5 + A6                                               S0700190
      IF(ABS(SUM-SUML) .LT. 1.E-8) GOTO 20                              S0700200
      GAM1 = GAM2                                                       S0700210
      GAM2 = GAM2*GAM                                                   S0700220
      GOTO 10                                                           S0700230
   20 RESULT = RESULT + SUM                                             S0700240
      RETURN                                                            S0700250
      END                                                               S0700260
      SUBROUTINE UPWIND(YR,FVR,SINNUM,COSNUM,YRS,YRC,JFLAG)             S0800010
C     THIS ROUTINE DETERMINES WHETHER OR NOT THE CURRENT RECEPTOR IS    S0800020
C     UPWIND OF THE SOURCE.  IF IT IS UPWIND 'JFLAG' IS SET GREATER     S0800030
C     THAN ZERO TO INDICATE THIS.  OTHERWISE THE X & Y SCALARS ARE      S0800040
C     COMPUTED.  THIS ROUTINE IS ONLY CALLED IN A POLAR COORDINATE      S0800050
C     SYSTEM.                                                           S0800060
C                                                                       S0800070
      DIMENSION SINNUM(1),COSNUM(1)                                     S0800080
      JFLAG = 0                                                         S0800090
      AABS = FVR - YR                                                   S0800100
      IF(AABS .GT. 180.) AABS = 360. - AABS                             S0800110
      IF(AABS .GT. 90.) GOTO 10                                         S0800120
      IYR = INT(YR)                                                     S0800130
      YRS = SINNUM(IYR)                                                 S0800140
      YRC = COSNUM(IYR)                                                 S0800150
      RETURN                                                            S0800160
   10 JFLAG = 1                                                         S0800170
      RETURN                                                            S0800180
      END                                                               S0800190
      SUBROUTINE SIGMAZ(XB,SZ,BB,IST,IXDIST,IFLAG,A,B,XZ)                S0900010
C     THIS ROUTINE CALCULATES THE VERTICAL SIGMA GIVEN THE EFFECTIVE     S0900020
C     DOWNWIND DISTANCE XB IN KILOMETERS AND STABILITY CATEGORY IST.     S0900030
C     IF IFLAG = 1, CALCULATE SIGMA Z.                                   S0900040
C     IF IFLAG = 2, CALCULATE AVERAGE 'B' ONLY.                          S0900050
C     IF IFLAG = 3, CALCULATE EFFECTIVE DOWNWIND DISTANCE INDEX IXDIST   S0900060
C                   AS A FUNCTION OF XB, XZ AND STABILITY.               S0900070
C                                                                        S0900080
      DIMENSION A(1),B(1),XZ(1),X1(10,6),INDSGZ(6)                       S0900090
C                                                                        S0900100
      DATA INDSGZ /0,8,11,12,18,26/                                      S0900110
      DATA X1 /.15,.2,.25,.3,.4,.5,3.11,1.E20,2*0.,   .2,.4,1.E20,7*0.,  S0900120
     1 1.E20,9*0.,   .3,1.,3.,10.,30.,1.E20,4*0.,   .3,1.,2.,4.,10.,20., S0900130
     2 40.,1.E20,2*0.,   .2,.7,1.,2.,3.,7.,15.,30.,60.,1.E20/            S0900140
C                                                                        S0900150
      GOTO (80,90,10,10) , IFLAG                                         S0900160
C                                                                        S0900170
C     NOTE THAT STABILITY CATEGORY C HAS ONLY 1 DISTANCE CATEGORY.       S0900180
   10 IF(IST .NE. 3) GOTO 20                                             S0900190
      IXDIST = 12                                                        S0900200
      RETURN                                                             S0900210
   20 X = XB                                                             S0900220
      I = 1                                                              S0900230
      II = 0                                                             S0900240
   30 IF(X-X1(I,IST) .LE. 0.0) GOTO 40                                   S0900250
      I = I + 1                                                          S0900260
      GOTO 30                                                            S0900270
   40 IF(I-II) 50,60,70                                                  S0900280
   50 IXDIST = IXDIST - 1                                                S0900290
   60 RETURN                                                             S0900300
   70 II = I                                                             S0900310
      IXDIST = INDSGZ(IST) + I                                           S0900320
      IF(IFLAG .GT. 3) RETURN                                            S0900330
      X = XB + XZ(IXDIST)                                                S0900340
      GOTO 30                                                            S0900350
C     CALCULATE VERTICAL SIGMA.                                          S0900360
   80 SZ = A(IXDIST)*XB**B(IXDIST)                                       S0900370
      RETURN                                                             S0900380
```

```
C       CALCULATE AVERAGE 'B'.                                          S0900390
     90 BB = 0.0                                                        S0900400
        I = IXDIST - INDSGZ(IST)                                        S0900410
        DO 100 J = 1,I                                                  S0900420
        I1 = INDSGZ(IST) + J                                            S0900430
    100 BB = BB + B(I1)                                                 S0900440
        BB = BB/FLOAT(I)                                                S0900450
        RETURN                                                          S0900460
        END                                                             S0900470
```

```
      FUNCTION ERFX(A,B)                                                S1000010
C     CALCULATE ERF(A) - ERF(B).                                        S1000020
C     HPL = LOWER LIMIT     -    HPU = UPPER LIMIT.                     S1000030
C                                                                       S1000040
      LOGICAL DONE                                                      S1000050
      DATA HPL,HPU /1.E-10,10./                                         S1000060
      ERF(X) = 1+X*(.705230784E-1+X*(.422820123E-1+X*(.92705272E-2+     S1000070
     1          X*(.1520143E-3+X*(.2765672E-3+X*.430638E-4)))))         S1000080
C                                                                       S1000090
      DONE = .FALSE.                                                    S1000100
      C = A                                                             S1000110
   10 C = ABS(C)                                                        S1000120
      IF(C .GT. HPL) GOTO 20                                            S1000130
      F = 1.                                                            S1000140
      GOTO 40                                                           S1000150
   20 IF(C .LT. HPU) GOTO 30                                            S1000160
      F = 0.0                                                           S1000170
      GOTO 40                                                           S1000180
   30 F = ERF(C)                                                        S1000190
      F = (1./F)**16                                                    S1000200
   40 IF(DONE) GOTO 50                                                  S1000210
      C = B                                                             S1000220
      G = F                                                             S1000230
      DONE = .TRUE.                                                     S1000240
      GOTO 10                                                           S1000250
   50 CONTINUE                                                          S1000260
      IF(A .GE. 0.0) GOTO 70                                            S1000270
      IF(B .LT. 0.0) GOTO 60                                            S1000280
      ERFX = F + G - 2.0                                                S1000290
      RETURN                                                            S1000300
   60 ERFX = G - F                                                      S1000310
      RETURN                                                            S1000320
   70 IF(B .LT. 0.0) GOTO 80                                            S1000330
      ERFX = F - G                                                      S1000340
      RETURN                                                            S1000350
   80 ERFX = 2.0 - (F + G)                                              S1000360
      RETURN                                                            S1000370
      END                                                               S1000380
      BLOCK DATA                                                        S1100010
C     SET DEFAULT VALUES.                                               S1100020
C                                                                       S1100030
      INTEGER TITLE                                                     S1100040
      COMMON /LOGIX/ ISW(40),NSOURC,NXPNTS,NYPNTS,NXWYPT,NGROUP,        S1100050
     1 NSOGRP(150),IDSOR(200),IPERD,NPNTS,NAVG,NHOURS,NDAYS,NTDAY,LINE, S1100060
     2 IO,IN,TITLE(15),IQUN(3),ICHIUN(7),CONDEP(6),LIMIT,MIMIT          S1100070
C                                                                       S1100080
      COMMON /MET/ IDAY(366),ISTAB(24),AWS(24),TEMP(24),AFV(24),        S1100090
     1 AFVR(24),HLH(24,2),P(24),DTHDZ(24),DECAY(24),PDEF(6,6),          S1100100
     2 DTHDEF(6,6),GAM1I,GAM2I,ZR,DDECAY,IMET,ITAP,TK,UCATS(5)          S1100110
C                                                                       S1100120
C     INITIALIZE WIND PROFILE EXPONENTS AND VERTICAL POTENTIAL          S1100130
C     TEMPERATURE GRADIENTS.                                            S1100140
      DATA PDEF /6*.1,6*.15,6*.2,6*.25,12*.3/                           S1100150
      DATA DTHDEF /24*0.0,6*.02,6*.035/                                 S1100160
C                                                                       S1100170
      END                                                               S1100180
```

APPENDIX B

COMPLETE FORTRAN LISTING OF THE INDUSTRIAL SOURCE COMPLEX LONG TERM MODEL (ISCLT) COMPUTER PROGRAM

```
C                                                                       S0100010
      COMMON CORE(40000)                                                S0100020
C                                                                       S0100030
      COMMON /DIM/ NSOURC,NXPNTS,NYPNTS,NXWYPT,NSEASN,NSPEED,NSTBLE,    S0100040
     1NSCTOR,ISW(20),UNITS(20),TITLE(20),NOFILE                         S0100050
      COMMON /MET/ FREQ(6,16,24),TA(6,4),HM(6,6,4),DPDZ(6,6),UBAR(6),   S0100060
     1P(6,6),PHI(16),ROTATE,G,ZR,BETA1,BETA2,DECAY,TK                   S0100070
      COMMON /REST/ IUNT,JUNT,NXXYY,NXXYYP,ISTBLE(6),IFLG3,LINE,NLINES, S0100080
     1ICARD,NXPSS,NYPSS,MUNT,NUNT,ICONT(3,2),ITSAVE(572),NT1,NT2,NT3,NT4S0100090
     2,MSG7(4,3),MSG8(2),MSG9(2,2),MSG10(4,3),NGROUP,NOCOMB(20),IDSORC(2S0100100
     300),IEND,XSEA,ISAVSO(300),NG,NGT,NXWY                             S0100110
      DIMENSION JSW(20),MSOR(68),NSOR(68),ITEMP(200)                    S0100120
      EQUIVALENCE (ITEMP(1),FREQ(1,1,1)),(ITEMP(1),JSW(1)),(ITEMP(21),MSS0100130
     1OR(1)),(NSOURC,NSOR(1))                                           S0100140
      INTEGER TITLE,UNITS                                               S0100150
      DATA NOCOMB/20*0/,J5/4H    /                                      S0100160
C                                                                       S0100170
C                                                                       S0100180
C                                                                       S0100190
C                                                                       S0100200
C     THIS COMPUTER PROGRAM IS DESIGNED TO CALCULATE THE AVERAGE        S0100210
C     SEASONAL AND/OR ANNUAL GROUND LEVEL CONCENTRATION OR TOTAL        S0100220
C     DEPOSITION FROM MULTIPLE CONTINUOUS POINT, VOLUME AND/OR AREA     S0100230
C     SOURCES. THE CALCULATION GRID SYSTEM CAN BE A CARTESIAN COORDINATES0100240
C     SYSTEM WITH 0 DEGREES NORTH AS THE POSITIVE Y AXIS AND 90 DEGREES S0100250
C     EAST AS THE POSITIVE X AXIS OR A POLAR COORDINATE SYSTEM WITH X   S0100260
C     AS THE AXIS OF RADIAL ARCS AND Y AS THE AXIS OF AZIMUTH BEARINGS  S0100270
C     WITH 0 DEGREES AS NORTH INCREASING POSITIVELY IN A CLOCKWISE      S0100280
C     DIRECTION. ALSO, PROVISION IS MADE FOR SPECIAL DISCRETE           S0100290
C     X,Y RECEPTOR POINTS THAT MAY CORRESPOND TO SAMPLER SITES, POINTS  S0100300
C     OF MAXIMA OR SPECIAL POINTS OF INTEREST. SOURCES CAN BE           S0100310
C     POSITIONED ANYWHERE RELATIVE TO THE GRID SYSTEM.                  S0100320
C                                                                       S0100330
C                                                                       S0100340
C     THIS COMPUTER PROGRAM IS WRITTEN IN STANDARD FORTRAN IV AND IS    S0100350
C     DESIGNED FOR USE ON MOST MEDIUM SIZED COMPUTERS (IBM 360,370 -    S0100360
C     CDC 6000 SERIES, UNIVAC 1100 SERIES, ETC). ALL ALPHANUMERIC       S0100370
C     (HOLLERITH) INFORMATION IS STORED 4 CHARACTERS (BYTES) TO AN      S0100380
```

```
C     INTEGER WORD. ALSO, THE VALUES OF SOME VARIABLES IN THE PROGRAM   S0100390
C     ASSUME AT LEAST A 32 BIT WORD. THE FUNCTION ACOS IS REFERENCED    S0100400
C     IN THIS PROGRAM IN SUBROUTINE DISTR AND MUST BE CHANGED TO ARCOS  S0100410
C     FOR IBM FORTRAN COMPILERS.                                        S0100420
C     BLANK COMMON IS USED TO STORE THE GRID SYSTEM AND ALL CALCULATION S0100430
C     RECEPTOR POINTS AND THE CONCENTRATION (DEPOSITION) ARRAYS.        S0100440
C     THE AMOUNT OF CORE IN BLANK COMMON USED BY                        S0100450
C     EACH VARIABLE IS DETERMINED AT EXECUTION TIME AND THE EQUATION    S0100460
C     OF CORE USED IN BLANK COMMON IS                                   S0100470
C                                                                       S0100480
C          CORE = [NXPNTS+NYPNTS+2*NXWYPT]+[(2*NSEASN+I)*(NXPNTS*NYPNTS+S0100490
C                 NXWYPT)]                                              S0100500
C                                                                       S0100510
C                     WHERE I = 0 IF TERRAIN ELEVATIONS ARE NOT USED    S0100520
C                                  (ISW(4)=0)                           S0100530
C                            I = 1 IF TERRAIN ELEVATIONS ARE USED       S0100540
C                                  (ISW(4)=1)                           S0100550
C                                                                       S0100560
C     SLIGHT EXCEPTIONS TO THIS EQUATION OCCUR UNDER TWO PROGRAM        S0100570
C     OPTIONS. THEY ARE NGROUP AND ISW(11) AND MAY SUPERCEDE THE ABOVE  S0100580
C     EQUATION IF REQUIREMENT C OF EITHER OPTION IS USED.               S0100590
C     THE VALUE OF CORE MUST BE LESS THAN OR EQUAL TO THE TOTAL SIZE    S0100600
C     OF THE ARRAY CORE IN BLANK COMMON AT THE BEGINNING OF THIS        S0100610
C     PROGRAM. ALSO, THE VARIABLE IEND FOLLOWING THE INPUT DATA COMMENT S0100620
C     CARDS MUST BE SET EQUAL TO THE TOTAL SIZE OF THE ARRAY CORE IN    S0100630
C     BLANK COMMON.                                                     S0100640
C                                                                       S0100650
C                                                                       S0100660
C                                                                       S0100670
C                                                                       S0100680
C***************LONG TERM ISC MODEL PROGRAM INPUTS *********************S0100690
C                                                                       S0100700
C     THE BELOW EXPLANATION OF THE PROGRAM INPUTS IS MEANT FOR THE      S0100710
C     EXPERIENCED USER. PLEASE READ THE MAIN PROGRAM DOCUMENTATION      S0100720
C     CAREFULLY BEFORE USING THIS PROGRAM AS A SINGLE ERROR CAN MAKE    S0100730
C     THE ENTIRE RESULTS ERRONEOUS.                                     S0100740
C                                                                       S0100750
C                                                                       S0100760
```

```
C-CARD GROUP 1 (20A4 FORMAT)                                            S0100770
C     TITLE - UP TO 80 CHARACTERS OF CASE TITLING INFORMATION           S0100780
C             (CARD COL. 1-80)                                          S0100790
C                                                                       S0100800
C-CARD GROUP 2 (20I2 FORMAT)                                            S0100810
C     ISW - ARRAY CONTAINING PROGRAM OPTIONS                            S0100820
C         NOTE - IF USING AN INPUT TAPE OPTIONS ISW(1), (2), (3), AND   S0100830
C                (4) ARE SET BY THE INPUT TAPE AND THE PROGRAM IGNORES  S0100840
C                ANY CARD VALUE.                                        S0100850
C         ISW(1)  - (CARD COL. 2)                                       S0100860
C                   IF = 0 OR 1 CONCENTRATION IS CALCULATED.            S0100870
C                  IF = 2 TOTAL DEPOSITION IS CALCULATED.               S0100880
C                   THIS OPTION IS IGNORED IF USING AN INPUT TAPE.      S0100890
C         ISW(2)  - (CARD COL. 4)                                       S0100900
C                   IF = 0 OR 1 THE GRID SYSTEM X AND Y AXES ARE ASSUMEDS0100910
C                         TO DEFINE A CARTESIAN COORDINATE SYSTEM WITH  S0100920
C                         NEGATIVE X AS WEST (270 DEG), POSITIVE X      S0100930
C                         AS EAST (90 DEG), NEG. Y AS SOUTH (180 DEG)   S0100940
C                         AND POS. Y AS NORTH (0 DEG).                  S0100950
C                  IF = 2 THE GRID SYSTEM X AND Y AXES ARE ASSUMED TO   S0100960
C                         DEFINE A POLAR COORDINATE SYSTEM WHERE THE X  S0100970
C                         AXIS DEFINES THE POLAR RADIALS AND THE Y AXIS S0100980
C                         DEFINES THE ANGULAR COORDINATES (AZIMUTH      S0100990
C                         BEARING). Y IS MEASURE IN A CLOCKWISE         S0101000
C                         DIRECTION STARTING AT 0 DEGREES NORTH.        S0101010
C                   THIS OPTION IS IGNORED IF USING AN INPUT TAPE.      S0101020
C         ISW(3)  - (CARD COL. 6)                                       S0101030
C                   IF = 0 OR 1 THE PROGRAM ASSUMES THE SPECIAL DISCRETES0101040
C                               X,Y CALCULATION RECEPTOR POINTS ARE     S0101050
C                             IN CARTESIAN COORDINATES.                 S0101060
C                  IF = 2 THE PROGRAM ASSUMES THE X,Y SPECIAL DISCRETE  S0101070
C                             CALCULATION RECEPTOR POINTS ARE IN        S0101080
C                             POLAR COORDINATES.                        S0101090
C                   THIS OPTION IS IGNORED IF USING AN INPUT TAPE,      S0101100
C         ISW(4)  - (CARD COL. 8)                                       S0101110
C                   IF = 0 NO TERRAIN ELEVATION DATA IS READ BY THE     S0101120
C                         PROGRAM                                       S0101130
C                  IF = 1 TERRAIN ELEVATION DATA IS READ                S0101140
```

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C                   THIS OPTION IS IGNORED BY THE PROGRAM IF USING AN  S0101150
C        ISW(5)  - (CARD COL. 10)                                       S0101160
C                   IF = 0 NO MASTER SAVE TAPE (SCRATCH TAPE) INPUT OR  S0101170
C                          OUTPUT IS ASSUMED.                           S0101180
C                  IF = 1 ALL PROGRAM INPUT DATA, SOURCE DATA AND       S0101190
C                         CALCULATIONS ARE WRITTEN TO MASTER SAVE TAPE  S0101200
C                          ON FORTRAN LOGICAL UNIT ISW(15). TWO FILE    S0101210
C                         MARKS ARE WRITTEN AFTER THE LAST RECORD ON    S0101220
C                         TAPE. THE TAPE IS BINARY AND THE LAST RECORD  S0101230
C                         WRITTEN ON TAPE HAS AN INTEGER 999999 IN WORD S0101240
C                         1 TO INDICATE END OF DATA.                    S0101250
C                                                                       S0101260
C                          - TAPE RECORD -            - CONTENTS -      S0101270
C                                 1     -   COMMON BLOCK /DIM/, 68 WORDSS0101280
C                                 2     -   X AXIS AND X SPECIAL POINTS,S0101290
C                                           NXPNTS+NXWYPT WORDS         S0101300
C                                 3     -   Y AXIS AND Y SPECIAL POINTS,S0101310
C                                           NYPNTS+NXWYPT WORDS         S0101320
C                                 4     -   TERRAIN ELEVATIONS Z, ONLY  S0101330
C                                           IF ISW(4) IS GREATER THAN 0.S0101340
C                                 5     -   COMMON BLOCK /MET/, 2573    S0101350
C                                           WORDS                       S0101360
C                                 6     -   COMMON BLOCK /SORC/, 219    S0101370
C                                           WORDS, SOURCE RECORD        S0101380
C                                 7     -   CONCENTRATION (DEPOSITION)  S0101390
C                                           FOR SEASON 1, NXPNTS*NYPNTS S0101400
C                                           +NXWYPT WORDS.              S0101410
C                                 8     -   CONCENTRATION (DEPOSITION)  S0101420
C                                           FOR SEASON 2 (IF PRESENT)   S0101430
C                                 9     -   CONCENTRATION (DEPOSITION)  S0101440
C                                           FOR SEASON 3 (IF PRESENT)   S0101450
C                                10     -   CONCENTRATION (DEPOSITION)  S0101460
C                                           FOR SEASON 4 (IF PRESENT)   S0101470
C                            RECORDS 6 THROUGH 10 ARE REPEATED FOR EACH S0101480
C                            SOURCE INPUT.                              S0101490
C                  IF = 2 PROGRAM INPUT DATA, SOURCE DATA, AND PREVIOUS S0101500
C                         CALCULATIONS ARE READ FROM MASTER SAVE TAPE   S0101510
C                         ON FORTRAN LOGICAL UNIT ISW(14) FOR UPDATE ANDS0101520
```

```
C                         /OR DISPLAY.                                  S0101530
C                  IF = 3 MASTER SAVE TAPES ARE BOTH READ AND WRITTEN   S0101540
C         ISW(6)  - (CARD COL. 12)                                      S0101550
C                   IF = 0 DO NOT PRINT INPUT DATA. THIS INCLUDES SOURCES0101560
C                          DATA.                                        S0101570
C                   IF = 1 PRINT ALL INPUT DATA EXCEPT SOURCE DATA.     S0101580
C                   IF = 2 PRINT SOURCE INPUT DATA ONLY.                S0101590
C                   IF = 3 PRINT ALL INPUT DATA.                        S0101600
C         ISW(7)  - (CARD COL. 14)                                      S0101610
C                   IF = 1 PRINT SEASONAL CONCENTRATION(DEPOSITION) ONLYS0101620
C                  IF = 2 PRINT ANNUAL CONCENTRATION (DEPOSITION) ONLY, S0101630
C                         (USED PRIMARILY WHEN INPUT DATA IS ANNUAL     S0101640
C                          ONLY)                                        S0101650
C                  IF = 0 OR 3 BOTH SEASONAL AND ANNUAL CONCENTRATION   S0101660
C                         (DEPOSITION) ARE PRINTED.                     S0101670
C         ISW(8)  - (CARD COL. 16)                                      S0101680
C                   IF = 1 PRINT ONLY THE CONCENTRATION (DEPOSITION)    S0101690
C                          FROM SELECTED INDIVIDUAL SOURCES. (SEE NOCOMBS0101700
C                          AND IDSORC BELOW).                           S0101710
C                   IF = 2 PRINT ONLY THE COMBINED CONCENTRATION        S0101720
C                          (DEPOSITION) SUMMED OVER THE SPECIFIED       S0101730
C                          SOURCES.                                     S0101740
C                   IF = 0 OR 3 PRINT BOTH SELECTED INDIVIDUAL SOURCES  S0101750
C                          AND THE COMBINED SUM OVER THE SPECIFIED      S0101760
C                          SOURCES.                                     S0101770
C         ISW(9)  - (CARD COL. 18)                                      S0101780
C                   USED TO DEFINE THE STABILITY MODE USED IN THE       S0101790
C                  CALCULATIONS OF THE STANDARD DEVIATIONS OF THE       S0101800
C                  LATERAL AND VERTICAL CONCENTRATION (DEPOSITION)      S0101810
C                  DISTRIBUTIONS AND THE VIRTUAL DISTANCES.             S0101820
C                  THIS PARAMETER MUST BE SET CORRECTLY IF INPUT DATA   S0101830
C                  CARD SOURCES ARE BEING PROCESSED.                    S0101840
C                  IF = 1 THE PROGRAM ASSUMES URBAN MODE 1 AND D, E AND S0101850
C                         F CATEGORIES ARE REDEFINED AS D.              S0101860
C                  IF = 2 THE PROGRAM ASSUMES URBAN MODE 2 AND STABILITYS0101870
C                         CATEGORIES 1 AND 2 ARE A, 3 IS B, 4 IS C AND  S0101880
C                         5 AND 6 ARE D.                                S0101890
C                  IF = 0, 3 OR BLANK THEPROGRAM ASSUMES RURAL MODE     S0101900
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C               1 AND DEFINES STABILITY CATEGORIES 1 TO 6 TO     S0101910
C               BE A THROUGH F.                                  S0101920
C     ISW(10) - (CARD COL. 20)                                   S0101930
C           ISW(10), ISW(11) AND ISW(12) ARE USED TO SPECIFY HOWS0101940
C        THE PROGRAM IS TO CALCULATE AND DISPLAY MAXIMUM VALUES. S0101950
C        IF ISW(10) IS LEFT BLANK OR ZERO IS PUNCHED THE MAXIMUM S0101960
C        10 VALUES OF CONCENTRATION OR DEPOSITION ARE NOT        S0101970
C        CALCULATED AND THE CONCENTRATION OR DEPOSITION AT ALL   S0101980
C        INPUT GRID SYSTEM AND SPECIAL DISCRETE RECEPTOR POINTS  S0101990
C        IS PRINTED.                                             S0102000
C        IF ISW(10) EQUALS 1 THE MAXIMUM 10 VALUES ARE CALCULATEDS0102010
C        ACCORDING TO ISW(11) AND ISW(12) AND ONLY THESE MAXIMUM S0102020
C        VALUES ARE PRINTED.                                     S0102030
C        IF ISW(10) EQUALS 2 THE MAXIMUM 10 VALUES ARE CALCULATEDS0102040
C        ACCORDING TO ISW(11) AND ISW(12) AND PRINTED, AS WELL   S0102050
C        AS, THE CONCENTRATION OR DEPOSITION AT ALL OTHER INPUT  S0102060
C        RECEPTOR POINTS.                                        S0102070
C     ISW(11) - (CARD COL. 22)                                   S0102080
C           IF SET NON-ZERO THE PROGRAM DETERMINES THE MAX. 10   S0102090
C        VALUES OF CONCENTRATION OR DEPOSITION FROM THE SET OF   S0102100
C        INPUT GRID SYSTEM AND ARBITRARILY SPACED RECEPTOR       S0102110
C        POINTS. (IF NON-ZERO THEN ISW(12) MUST BE ZERO)         S0102120
C        IF SET EQUAL TO 1 THE MAXIMUM 10 VALUES OF EACH         S0102130
C        INDIVIDUAL SOURCE AND COMBINED SOURCES ARE CALCULATED   S0102140
C        AND PRINTED INDEPENDENTLY OF EACH OTHER.                S0102150
C        IF SET EQUAL TO 2 THE MAXIMUM 10 VALUES OF THE COMBINED S0102160
C        SOURCES DETERMINES WHICH 10 POINTS OF EACH CONTRIBUTING S0102170
C        SOURCE TO PRINT.                                        S0102180
C     *** WARNING - THIS OPTION REQUIRES AT LEAST ONE OF THE     S0102190
C                   FOLLOWING -                                  S0102200
C             A - THE PROGRAM USES AN OUTPUT TAPE.               S0102210
C             B - THE PROGRAM USES AN INPUT TAPE AND NO INPUT    S0102220
C                 CARD SOURCES.                                  S0102230
C             C - THE TOTAL NUMBER OF SOURCES USED TO FORM EACH  S0102240
C                 COMBINATION OF SOURCES FOR MAXIMUM CALCULATIONSS0102250
C                 IS LESS THAN OR EQUAL TO THE MINIMUM OF I AND  S0102260
C                 J BELOW. COUNT EACH SOURCE ONLY ONCE. I.E.     S0102270
C                 IF A SOURCE IS IN MORE THAN ONE COMBINATION    S0102280
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C                       ONLY COUNT IT ONCE FOR THIS CHECK.                S0102290
C                         I AND J ARE -                                   S0102300
C                         I = (IEND-(NXPNTS+NYPNTS+2*NXWYPT)-K-L)/        S0102310
C                             (NSEASN*(NXPNTS*NYPNTS+NXWYPT))             S0102320
C                                                                         S0102330
C                             IEND = SIZE OF BLANK COMMON (DESIGN SIZE    S0102340
C                                    IS 40000)                            S0102350
C                             K = NSEASN*(NXPNTS*NYPNTS+NXWYPT)           S0102360
C                             L = NXPNTS*NYPNTS+NXWYPT                    S0102370
C                                 IF ISW(4)=0                             S0102380
C                               = 0                                       S0102390
C                                 IF ISW(4) IS NON-ZERO                   S0102400
C                         J = 300                                         S0102410
C                                                                         S0102420
C     ISW(12) - (CARD COL. 24)                                            S0102430
C            IF SET NON-ZERO THE PROGRAM ASSUMES THE USER IS              S0102440
C        SPECIFYING THE SET(S) OF 10 RECEPTOR POINTS USED TO              S0102450
C        CALCULATE MAXIMUMS. THE PROGRAM ASSUMES THE USER HAS             S0102460
C        INPUT THESE RECEPTOR POINTS INTO THE ARRAYS FOR                  S0102470
C          SPECIAL DISCRETE POINTS. IF THIS OPTION IS USED                S0102480
C          AND TAPE INPUT IS ALSO USED, CARD GROUPS 6A AND 7A             S0102490
C          BELOW ARE READ BY THE PROGRAM AND REPLACE ALL                  S0102500
C          RECEPTOR POINTS ON THE INPUT TAPE. ALSO, IF                    S0102510
C          THE INPUT TAPE CONTAINS TERRAIN ELEVATIONS CARD GROUPS0102520
C          8A IS READ AFTER 7A. MAKE SURE NXWYPT SPECIFIES THE            S0102530
C          TOTAL NUMBER OF POINTS. IF THE USER INPUTS ONLY 10             S0102540
C        POINTS SEASONAL AND ANNUAL CALCULATIONS ARE PERFORMED            S0102550
C        ON THESE 10 POINTS. IF THE USER INPUTS MORE THAN 10              S0102560
C        POINTS THE PROGRAM ASSUMES THE FIRST 10 ARE FOR SEASON 1S0102570
C        , THE SECOND 10 ARE FOR SEASON 2, AND THE LAST 10 ARE            S0102580
C        FOR ANNUAL CALCULATIONS. FOR EXAMPLE IF WE HAVE FOUR             S0102590
C        SEASONS OF MET DATA TO INPUT AND SEASONAL AND ANNUAL             S0102600
C        CALCULATIONS ARE PERFORMED ON SEPARATE SETS OF POINTS            S0102610
C        THEN 50 POINTS MUST BE INPUT. IF ONLY SEASONAL CALCS             S0102620
C        WERE PERFORMED ONLY 40 POINTS WOULD BE REQUIRED.                 S0102630
C        IF THE LAST OF THE 10 POINTS IN ANY SET HAVE BOTH X              S0102640
C        AND Y ZERO THEY ARE IGNORED AND LESS THAN 10 ARE                 S0102650
C        ACTUALLY PROCESSED. THE VARIABLE NXWYPT SPECIFIES THE            S0102660
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C              TOTAL NUMBER OF POINTS THE USER HAS PROVIDED.         S0102670
C        ISW(13) - (CARD COL. 25-26)                                 S0102680
C                    OPTIONAL PRINT OUTPUT UNIT. IF LEFT BLANK OR ZERO ISS0102690
C              PUNCHED ALL PRINT OUTPUT GOES TO UNIT 6. IF PUNCHED   S0102700
C              NON-ZERO ALL PRINT OUTPUT GOES TO THE SPECIFIED UNIT. S0102710
C              TWO END OF FILE MARKS ARE WRITTEN AT THE END OF THE   S0102720
C              ALTERNATE PRINT FILE IF A POSITIVE VALUE IS PUNCHED.  S0102730
C              IF A NEGATIVE VALUE IS PUNCHED THE END OF FILE MARKS  S0102740
C              ARE NOT WRITTEN. CAUTION - SOME FORTRAN COMPILERS     S0102750
C              SPECIFY AN AUTOMATIC WRITE END OF FILE AND REWIND     S0102760
C              (CLOSE FILES) ON OUTPUT FILES AT THE END OF A PROGRAM S0102770
C              RUN.                                                  S0102780
C        ISW(14) - (CARD COL. 27-28)                                 S0102790
C                    OPTIONAL TAPE INPUT UNIT NUMBER. IF BLANK OR 0 THE S0102800
C                    PROGRAM USES LOGICAL UNIT 2. IF YOU ARE USING A MASSS0102810
C                    STORAGE FILE FOR INPUT. YOU MUST PUNCH A NEGATIVE S0102820
C                    VALUE FOR ISW(14). A POSITIVE VALUE SPECIFIES TAPE. S0102830
C        ISW(15) - (CARD COL. 29-30)                                 S0102840
C                    OPTIONAL TAPE OUTPUT UNIT NUMBER. IF BLANK OR 0 THE S0102850
C                    PROGRAM USES LOGICAL UNIT 3. IF YOU ARE USING A MASSS0102860
C                    STORAGE FILE FOR OUTPUT YOU MUST PUNCH A NEGATIVE S0102870
C                    VALUE FOR ISW(15). A POSITIVE VALUE SPECIFIES TAPE S0102880
C        ISW(16) - (CARD COL. 32)                                    S0102890
C                    IF LEFT BLANK OR ZERO IS PUNCHED THE PROGRAM STARTS S0102900
C                    EACH NEW TABLE OF CONCENTRATION OR DEPOSITION ON S0102910
C                    A NEW PAGE. ALSO, SOME CONTINUATIONS OF THE SAME S0102920
C                    TABLE ARE STARTED ON A NEW PAGE.                S0102930
C                    IF PUNCHED NON-ZERO THE PROGRAM ATTEMPTS TO SAVE S0102940
C                    OUTPUT PAPER BY COMPRESSING THE OUTPUT AND      S0102950
C                    MINIMIZING PAGE EJECTION.                       S0102960
C        ISW(17) - (CARD COL. 33-34)                                 S0102970
C                    OPTIONAL NUMBER OF PRINT LINES PER PAGE. THIS VALUE S0102980
C                    IS INITIALIZED TO 57 LINES PER PAGE. IF YOUR    S0102990
C                    INSTALLATION PRINTER IS SET DIFFERENTLY PUNCH THE S0103000
C                    CORRECT NUMBER OF LINES PER PAGE.               S0103010
C        ISW(18) - (CARD COL 35-36)                                  S0103020
C                    IF LEFT BLANK OR ZERO THE PROGRAM DOES NOT READ S0103030
C                    CARD GROUP 9. (SEE CARD GROUP 9 - FMT)          S0103040
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C                   IF PUNCHED NON-ZERO CARD GROUP 9 IS READ BY THE     S0103050
C                   PROGRAM ONLY IF THERE IS NO TAPE INPUT.             S0103060
C         ISW(19) - OPTION TO CALCULATE PLUME RISE AS A FUNCTION OF     S0103070
C                   DOWNWIND DISTANCE FOR STACK SOURCES                 S0103080
C                   IF = 0 THE PROGRAM CALCULATES FINAL PLUME RISE      S0103090
C                          INDEPENDENTLY OF DOWNWIND DISTANCE.          S0103100
C                   IF = 1 THE PLUME RISE CALCULATION IS A FUNCTION     S0103110
C                          OF DOWNWIND DISTANCE.                        S0103120
C         ISW(20) - OPTION TO ADD THE BRIGGS (1973) DOWNWASH CORRECTION S0103130
C                   FOR STACK SOURCES                                   S0103140
C                   IF = 0 NO DOWNWASH CORRECTION IS MADE               S0103150
C                   IF = 1 THE BRIGGS (1973) DOWNWASH CORRECTION IS     S0103160
C                          APPLIED TO ALL STACK SOURCES                 S0103170
C                                                                       S0103180
C-CARD GROUP 3 (10I4)                                                   S0103190
C     NSOURC - (CARD COL. 1-4)                                          S0103200
C              NUMBER OF CARD INPUT SOURCES (UNLIMITED)                 S0103210
C              IF SET EQUAL TO A NEGATIVE NUMBER THE PROGRAM WILL       S0103220
C              CONTINUE TO READ SOURCES UNTIL A NEGATIVE SOURCE         S0103230
C              IDENTIFICATION NUMBER IS READ.                           S0103240
C     NGROUP - (CARD COL. 5-8)                                          S0103250
C              NUMBER OF DIFFERENT SOURCE COMBINATIONS (SUM OF SOURCES) S0103260
C              TO OUTPUT. IF NGROUP IS LEFT BLANK OR PUNCHED ZERO THEN S0103270
C              ALL INPUT SOURCES ARE USED TO FORM ANY COMBINED (SUMMED) S0103280
C              SOURCE OUTPUT AND ANY OUTPUT OF INDIVIDUAL SOURCES. IF   S0103290
C              NGROUP IS PUNCHED NON-ZERO IT GIVES THE NUMBER OF        S0103300
C              DIFFERENT SOURCE COMBINATIONS AND THE DETAILS OF THE     S0103310
C              SOURCE COMBINATIONS ARE READ IN CARD GROUP 4 BELOW.      S0103320
C              (MAXIMUM = 20)                                           S0103330
C         ** WARNING - NGROUP CANNOT BE SET TO A NON-ZERO VALUE UNLESS  S0103340
C              ONE OR MORE OF THE FOLLOWING CONDITIONS IS MET -         S0103350
C                  A - THE PROGRAM IS USING AN OUTPUT TAPE.             S0103360
C                  B - THE PROGRAM IS USING AN INPUT TAPE WITH NO       S0103370
C                      CARD SOURCES, NSOURC = 0.                        S0103380
C                  C - THE TOTAL NUMBER OF INDIVIDUAL SOURCES USED TO   S0103390
C                      FORM ALL COMBINATIONS DESIRED (COUNT EACH SOURCE S0103400
C                      ONLY ONCE) IS LESS THAN OR EQUAL TO THE MINIMUM  S0103410
C                      OF I AND J -                                     S0103420
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C              WHERE -                                                S0103430
C           ** I = (IEND-(NXPNTS+NYPNTS+2*NXWYPT)-K-L)/               S0103440
C                  (NSEASN*(NXPNTS*NYPNTS+NXWYPT))                    S0103450
C                                                                     S0103460
C                IEND = SIZE OF BLANK COMMON (DESIGN SIZE             S0103470
C                       = 40000)                                      S0103480
C                K = NSEASN*(NXPNTS*NYPNTS+NXWYPT)                    S0103490
C                    IF ISW(8) IS NOT 1 OR ISW(11) = 2                S0103500
C                  = 0                                                S0103510
C                    IF ISW(8)=1 AND ISW(11) IS NOT 2                 S0103520
C                L = NXPNTS*NYPNTS+NXWYPT                             S0103530
C                    IF ISW(7)=1 AND NSEASN)1                         S0103540
C           ** J = 300                                                S0103550
C                                                                     S0103560
C   NXPNTS - (CARD COL. 9-12)                                         S0103570
C            NUMBER OF RECEPTOR POINTS IN THE X AXIS OF THE           S0103580
C            CALCULATION GRID SYSTEM. THIS PARAMETER IS IGNORED IF    S0103590
C            TAPE INPUT IS BEING USED.                                S0103600
C             IF NXPNTS IS GREATER THAN 2 AND ONLY TWO VALUES OF X ARES0103610
C             INPUT IN CARD GROUP 6, THE PROGRAM ASSUMES X(1) IS THE  S0103620
C             FIRST POINT AND USES X(2) AS AN INCREMENT TO GENERATE   S0103630
C             POINTS X(2) THROUGH X(NXPNTS).                          S0103640
C   NYPNTS - (CARD COL. 13-16)                                        S0103650
C            NUMBER OF RECEPTOR POINTS IN THE Y AXIS OF THE           S0103660
C            CALCULATION GRID SYSTEM. THIS PARAMETER IS IGNORED IF    S0103670
C            TAPE INPUT IS BEING USED.                                S0103680
C             IF NYPNTS IS GREATER THAN 2 AND ONLY TWO VALUES OF Y ARES0103690
C             INPUT IN CARD GROUP 7, THE PROGRAM ASSUMES Y(1) IS THE  S0103700
C             FIRST POINT AND USES Y(2) AS AN INCREMENT TO GENERATE   S0103710
C             POINTS Y(2) THROUGH Y(NYPNTS)                           S0103720
C   NXWYPT - (CARD COL. 17-20) (MUST BE PUNCHED IF ISW(12) ) 0)       S0103730
C            NUMBER OF SPECIAL DISCRETE RECEPTOR CALCULATION          S0103740
C            POINTS. THESE ARE ADDITIONAL CALCULATION POINTS OR IN    S0103750
C            LIEU OF THE REGULAR GRID SYSTEM POINTS. ALSO, THIS VALUE S0103760
C            SPECIFIES THE NUMBER OF POINTS DESIRED FOR MAXIMUMS UNDERS0103770
C            ISW(12). SEE ISW(12).                                    S0103780
C   NSEASN - (CARD COL. 21-24)                                        S0103790
C            NUMBER OF SEASONS IN INPUT METEOROLOGICAL DATA (FREQ, TA,S0103800
C              HM, ETC.) (MAX = 4). IF YOU HAVE ANNUAL DATA ONLY SET    S0103810
C              NSEASN EQUAL TO ONE. (DEFAULT = 1). THIS VALUE IS        S0103820
C              IGNORED IF YOU ARE USING TAPE INPUT.                     S0103830
C     NSPEED - (CARD COL. 25-28)                                        S0103840
C              NUMBER OF WIND SPEED CATEGORIES IN THE INPUT             S0103850
C              METEOROLOGICAL DATA. (MAX. = 6 AND DEFAULT = 6). THIS    S0103860
C              PARAMETER IS IGNORED IF YOU ARE USING TAPE INPUT.        S0103870
C     NSTBLE - (CARD COL. 29-32)                                        S0103880
C              NUMBER OF PASQUILL STABILITY CATEGORIES IN THE INPUT     S0103890
C              METEOROLOGICAL DATA (FREQ, TA, HM, DPDZ, P).(DEFAULT=6)  S0103900
C              (MAX. = 6). STABILITY CATEGORIES 1 THROUGH 6 FOR THE     S0103910
C              METEOROLOGICAL DATA CORRESPONDING TO PASQUILL CATEGORIES S0103920
C              A THROUGH F. ON INPUT IF THERE ARE LESS THAN 6 STABILITY S0103930
C              CATEGORIES THE PROGRAM ASSUMES THE MISSING CATEGORIES    S0103940
C              HAVE BEEN COMBINED INTO THE LAST CATEGORY INPUT.         S0103950
C     NSCTOR - (CARD COL. 33-36)                                        S0103960
C              NUMBER OF WIND DIRECTION SECTOR CATEGORIES IN THE INPUT  S0103970
C              FREQUENCY DISTRIBUTION (FREQ). (MAX. = 16) IF LEFT BLANK S0103980
C              OR ZERO IS PUNCHED THE PROGRAM ASSUMES 16.               S0103990
C     NOFILE - (CARD COL. 37-40)                                        S0104000
C              FILE NUMBER OF DATA SET TO BE WRITTEN TO OUTPUT TAPE     S0104010
C              (ISW(5)=1 OR 3) OR IF NO OUTPUT FILE IS BEING WRITTEN,   S0104020
C              THE GILE NUMBER OF THE DATA SET TO BE READ FROM TAPE     S0104030
C              (ISW(5)=2). THIS PARAMETER MUST BE SPECIFIED IF CONDITIONS0104040
C              A OR CONDITION B IS SELECTED UNDER EITHER ISW(11) OR     S0104050
C              NGROUP. THE USER MUST POSITION TAPES TO THEIR CORRECT    S0104060
C              FILE NUMBER PRIOR TO EXECUTION AND ISCLT USES NOFILE TO  S0104070
C              POSITION THE TAPE IT ASSEMBLES REPORTS FROM DURING       S0104080
C              EXECUTION. NOFILE DOES NOT APPLY TO MASS-STORAGE FILES   S0104090
C              AS THESE FILES ARE ASSUMED TO BE ONLY ONE FILE. THE      S0104100
C              DEFAULT FOR NOFILE IS 1.                                 S0104110
C                                                                       S0104120
C-CARD GROUP 4 (20I4) AND (13I6) (THIS CARD GROUP IS NOT READ IF NGROUP S0104130
C     ABOVE IS ZERO OR BLANK. CARD GROUP 4 IS ACTUALLY 2 CARD GROUPS.   S0104140
C     THE FIRST IS THE ARRAY NOCOMB AND THE SECOND IS THE ARRAY IDSORC. S0104150
C     NOCOMB - (CARD COL. 1-4,5-8,---,77-80) (1 OR MORE CARDS)          S0104160
C              ARRAY USED TO SPECIFY THE NUMBER OF SOURCE ID NUMBERS    S0104170
C              USED TO DEFINE A SOURCE COMBINATION. THE FIRST VALUE     S0104180
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419*      C            PUNCHED ON THIS CARD GIVES THE NUMBER OF VALUES (SOURCE  S0104190
420*      C            ID NUMBERS) PUNCHED IN THE FIRST PART OF THE ARRAY IDSORCS0104200
421*      C            BELOW FOR THE FIRST SOURCE COMBINATION. (MAX = 20 VALUES)S0104210
422*      C     IDSORC - (CARD COL. 1-6,7-12,---,73-78) (1 OR MORE CARDS)       S0104220
423*      C            ARRAY USED TO SPECIFY THE SOURCE ID NUMBERS TO USE IN    S0104230
424*      C            FORMING THE COMBINED SOURCE OUTPUT AND INDIVIDUAL SOURCE S0104240
425*      C            OUTPUT. IF A POSITIVE VALUE IS PUNCHED THAT SOURCE IS    S0104250
426*      C            INCLUDED. IF A NEGATIVE VALUE IS PUNCHED THAT SOURCE IS  S0104260
427*      C            INCLUDED, AS WELL AS, ALL SOURCES LESS IN ABSOLUTE VALUE S0104270
428*      C            UP TO AND INCLUDING THE PREVIOUS POSITIVE SOURCE PUNCHED S0104280
429*      C            IF THERE IS ONE AND IF IT IS PART OF THE SAME GROUP.     S0104290
430*      C            FOR EXAMPLE ASSUME NGROUP EQUALS 3. ALSO, ASSUME THE     S0104300
431*      C            VALUES PUNCHED INTO NOCOMB ARE 1, 4, 3 AND THE VALUES    S0104310
432*      C            PUNCHED INTO IDSORC ARE -32, 7,10,-22,25, -15, 17, 18.   S0104320
433*      C            THE PROGRAM WILL PRODUCE 3 COMPLETE SETS OF OUTPUT. THE  S0104330
434*      C            FIRST WILL INCLUDE ALL SOURCES 1 THROUGH 32. THE SECOND  S0104340
435*      C            WILL INCLUDE SOURCE 7, 10 THROUGH 22 AND 25. THE THIRD   S0104350
436*      C            OR LAST SET OF OUTPUT WILL INCLUDE SOURCES 1 THROUGH 15  S0104360
437*      C            AND SOURCES 17 AND 18. NOTE THAT THE SOURCE ID NUMBERS   S0104370
438*      C            IN EACH GROUP MUST BE IN ASCENDING ABSOLUTE VALUE IN     S0104380
439*      C            THEIR RESPECTIVE GROUP. ALSO, THESE VALUES ARE THE       S0104390
440*      C            SOURCE ID NUMBERS YOU HAVE ASSIGNED AND NOT NECESSARILY  S0104400
441*      C            THE RELATIVE INDEX NUMBER UNLESS ALL SOURCE ID NUMBERS   S0104410
442*      C            ARE BEING OR HAVE BEEN DEFAULTED. (MAX. NO. OF VALUES    S0104420
443*      C            IS 200)                                                  S0104430
444*      C                                                                     S0104440
445*      C *** NOTE - IF YOU ARE USING TAPE INPUT ONLY CARD GROUPS 6A,7A,8A AND  S0104450
446*      C          17 THROUGH 17D CAN BE INPUT AND 6A, 7A ARE READ ONLY IF    S0104460
447*      C          ISW(12) = 1 AND NXWYPT IS NON-ZERO AND 8A IS READ ONLY IF  S0104470
448*      C          ISW(12) = 1, NXWYPT IS NON-ZERO AND ISW(4) = 1 OR THE INPUTS0104480
449*      C          TAPE CONTAINS TERRAIN ELEVATIONS.                          S0104490
450*      C                                                                     S0104500
451*      C-CARD GROUP 5 (10A4,10A4 FORMAT) (NOT READ IF TAPE INPUT)            S0104510
452*      C     UNITS - (CARD COL. 1-40 AND 41-80)                              S0104520
453*      C            THE FIRST 40 CHARACTERS OF UNITS GIVES THE CONCENTRATION S0104530
454*      C            (DEPOSITION) OUTPUT UNITS LEFT JUSTIFIED. THE SECOND 40  S0104540
455*      C            CHARACTERS STARTING IN COL. 41 GIVES THE SOURCE INPUT    S0104550
456*      C            UNITS. IF THE SOURCE IS AN AREA SOURCE THE PROGRAM       S0104560
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C              AUTOMATICALLY APPENDS "/SQUARE METER" ON THE END OF THE   S0104570
C              SOURCE INPUT UNITS. THIS CARD IS AUTOMATICALLY FILLED IF  S0104580
C              THE PARAMETER TK (CARD GROUP 13) BELOW IS DEFAULTED AND   S0104590
C              CAN BE LEFT BLANK.                                        S0104600
C                                                                        S0104610
C-CARD GROUP 6 (8F10.0 FORMAT) (NOT READ IF TAPE INPUT OR NXPNTS = 0)    S0104620
C     X - ARRAY OF NXPNTS POINTS IN ASCENDING ORDER (MINUS TO POS.)      S0104630
C         DEFINING THE X AXIS OF THE CALCULATION RECEPTOR GRID SYSTEM    S0104640
C         (METERS). IF ONLY THE FIRST 2 X VALUES ARE NON-ZERO AND NXPNTSS0104650
C         IS GREATER THAN 2 THEN THE PROGRAM ASSUMES THE FIRST POINT     S0104660
C         IS THE START OF THE AXIS, THE SECOND POINT IS ACTUALLY AN      S0104670
C         INCREMENT TO GENERATE THE REMAINING POINTS AND THE PROGRAM     S0104680
C         THEN GENERATES THE X AXIS INTERNALLY. (CARD COL. 1-10,11-20,   S0104690
C         21-30,---,71-80 ON EACH CARD)                                  S0104700
C                                                                        S0104710
C-CARD GROUP 6A (8F10.0 FORMAT) (NOT READ IF NXWYPT = 0)                 S0104720
C     X - ARRAY OF NXWYPT SPECIAL ARBITRARILY SPACED RECEPTOR POINTS     S0104730
C         (METERS). EACH POINT INPUT INTO THIS ARRAY MUST HAVE A         S0104740
C         CORRESPONDING Y COORDINATE INPUT INTO CARD GROUP 7A.           S0104750
C         (CARD COL. 1-10,11-20,---,71-80 ON EACH CARD)                  S0104760
C                                                                        S0104770
C-CARD GROUP 7 (8F10.0 FORMAT) (NOT READ IF TAPE INPUT OR NYPNTS = 0)    S0104780
C     Y - ARRAY OF NYPNTS POINTS IN ASCENDING ORDER (MINUS TO POS.)      S0104790
C         DEFINING THE Y AXIS OF THE CALCULATION RECEPTOR GRID SYSTEM    S0104800
C         (METERS OR DEGREES IF POLAR SYSTEM). IF ONLY THE FIRST 2 Y     S0104810
C         VALUES ARE PUNCHED (NON-ZERO) AND NYPNTS IS GREATER THAN 2     S0104820
C         THEN THE PROGRAM ASSUMES THE FIRST POINT IS THE START OF THE   S0104830
C         AXIS AND THE SECOND IS ACTUALLY AN INCREMENT USED TO GENERATE S0104840
C         THE REMAINING POINTS FOR THE AXIS INTERNALLY. (CARD COL. 1-10,S0104850
C         11-20,---,71-80 ON EACH CARD).                                 S0104860
C                                                                        S0104870
C-CARD GROUP 7A (8F10.0 FORMAT) (NOT READ IF NXWYPT = 0)                 S0104880
C     Y - ARRAY OF NXWYPT SPECIAL ARBITRARILY SPACED RECEPTOR POINTS     S0104890
C         (METERS OR DEGREES IF POLAR) THAT CORRESPOND TO EACH POINT     S0104900
C         INPUT TO CARD GROUP 6A.                                        S0104910
C                                                                        S0104920
C-CARD GROUP 8 (8F10.0 FORMAT) (READ ONLY IF ISW(4) = 1)                 S0104930
C     Z - ARRAY OF TERRAIN ELEVATIONS FOR THE CALCULATION GRID SYSTEM    S0104940
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C          ( FEET).   THE Z VALUES FOR EACH POINT ON THE X AXIS ARE READ  S0104950
C          FOR EACH VALUE ON THE Y AXIS. START A NEW GROUP OF X AXIS DATAS0104960
C          CARDS FOR EACH Y POINT 1 TO NYPNTS.                            S0104970
C          (CARD COL. 1-10,11-20,---,71-80 ON EACH CARD)                  S0104980
C                                                                         S0104990
C-CARD GROUP 8A (8F10.0 FORMAT (READ ONLY IF ISW(4) = 1 AND NXWYPT IS     S0105000
C               GREATER THAN ZERO.)                                       S0105010
C      Z - ARRAY OF TERRAIN ELEVATIONS FOR EACH ARBITRARILY SPACED         S0105020
C          RECEPTOR POINT INPUT INTO CARD GROUPS 6A AND 7A. ( FEET)       S0105030
C          THE ELEVATIONS Z MUST BE LESS THAN OR EQUAL TO THE ELEVATION   S0105040
C          OF THE EMISSIONS OF STACK OR VOLUME SOURCES.                   S0105050
C          (CARD COL. 1-10,11-20,---,71-80 ON EACH CARD)                  S0105060
C                                                                         S0105070
C-CARD GROUP 9 (20A4 FORMAT ) (NOT READ IF TAPE INPUT OR ISW(18)=0)       S0105080
C      FMT - FORTRAN FORMAT OF THE FREQUENCY OF OCCURRENCE OF SPEED AND   S0105090
C            DIRECTION "FREQ". IF ISW(18)=0 THE PROGRAM DEFAULTS THE      S0105100
C            FORMAT TO (6F10.0) AND CARD GROUP 9 IS NOT READ. IF          S0105110
C            ISW(18) IS NON-ZERO THE PROGRAM READS THE FORMAT ON THIS     S0105120
C            DATA CARD INCLUDING LEADING AND ENDING PARENTHESIS AND USES S0105130
C            THE INPUT FORMAT READ TO READ CARD GROUP 9A.                 S0105140
C-CARD GROUP 9A (FORMAT FMT USED) (THIS CARD GROUP IS NOT READ IF AN      S0105150
C                INPUT TAPE IS BEING USED)                                S0105160
C      FREQ - ARRAY OF FREQUENCY OF OCCURRENCES OF WIND SPEED, WIND       S0105170
C             DIRECTION, STABILITY AND SEASON EXPRESSED AS A PERCENTAGE   S0105180
C             OR A FRACTION. THE SUM OF ALL VALUES OF FREQ OVER A SINGLE S0105190
C             SEASON MUST BE APPROXIMATELY EQUAL TO 100.0 OR 1.0. THESE   S0105200
C             VALUES ARE READ WITH NSPEED VALUES PER CARD, NSCTOR CARDS   S0105210
C             PER STABILITY AND NSTBLE GROUPS OF THESE CARDS PER SEASON   S0105220
C             1 TO NSEASN.                                                S0105230
C             NSPEED*NSCTOR*NSTBLE*NSEASN VALUE  ARE READ.                S0105240
C                                                                         S0105250
C-CARD GROUP 10 (6F10.0 FORMAT) (NOT READ IF INPUT TAPE)                  S0105260
C      TA - ARRAY OF AMBIENT AIR TEMPERATURES (DEG K). THERE ARE NSTBLE   S0105270
C           VALUES READ PER CARD AND NSEASN CARDS READ. IF ANY OF THE     S0105280
C           SECOND THROUGH NSTBLE VALUES ON A CARD ARE ZERO THE PROGRAM   S0105290
C           SETS IT EQUAL TO THE LAST NON-ZERO VALUE ENCOUNTERED AS IT    S0105300
C           SCANS THE DATA CARD FROM LEFT TO RIGHT.                       S0105310
C           (CARD COL. 1-10,11-20,---,51-60 ON EACH CARD)                 S0105320
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C                                                                       S0105330
C-CARD GROUP 11 (6F10.0 FORMAT) (NOT READ IF INPUT TAPE)                S0105340
C       HM - ARRAY OF MIXING LAYER HEIGHTS (METERS). THERE ARE NSPEED   S0105350
C            VALUES READ PER CARD, AND NSTBLE CARDS READ PER SEASON 1 TO S0105360
C            NSEASN. IF ANY OF THE SECOND THROUGH NSPEED VALUES ON A CARD S0105370
C            ARE ZERO, THE PROGRAM SETS IT EQUAL TO THE LAST NON-ZERO   S0105380
C            VALUE ENCOUNTERED AS IT SCANS THE DATA CARD FROM LEFT TO   S0105390
C            RIGHT.                                                     S0105400
C            (CARD COL. 1-10,11-20,---,51-60 ON EACH CARD)              S0105410
C                                                                       S0105420
C-CARD GROUP 12 (6F10.0 FORMAT) (NOT READ IF INPUT TAPE)                S0105430
C       DPDZ - ARRAY OF VERTICAL GRADIENTS OF POTENTIAL TEMP. (DEG/METER).S0105440
C              THERE ARE NSPEED VALUES READ PER CARD AND NSTBLE CARDS   S0105450
C              READ. IF THE FIRST VALUE ON A DATA CARD IS ZERO FOR CARDS S0105460
C              1 TO 4 (A TO D) OF THIS CARD GROUP THEY ARE LEFT ZERO FOR S0105470
C              UNSTABLE CONDITIONS. IF THE FIRST VALUE ON CARDS 5 OR 6  S0105480
C              (E OR F) OF THIS CARD GROUP ARE ZERO THE PROGRAM DEFAULTS S0105490
C              TO 0.02 AND 0.035 RESPECTIVELY FOR STABLE CONDITIONS. ALSO,S0105500
C              IF THE SECOND THROUGH NSPEED VALUES ON ANY CARD ARE ZERO S0105510
C              IT IS SET EQUAL TO THE LAST NON-ZERO VALUE ENCOUNTERED AS S0105520
C              THE DATA CARD IS SCANNED FROM LEFT TO RIGHT.             S0105530
C              (CARD COL. 1-10,11-20,---,51-60 ON EACH CARD)            S0105540
C                                                                       S0105550
C-CARD GROUP 13 (7F10.0 FORMAT) (NOT READ IF INPUT TAPE)                S0105560
C       ROTATE - (CARD COL. 1-10)                                       S0105570
C                THIS PARAMETER IS USED TO CORRECT FOR ANY DIFFERENCE IN S0105580
C                NORTH AS DEFINED BY THE X,Y GRID SYSTEM AND NORTH AS   S0105590
C                DEFINED BY THE WEATHER STATION AT WHICH THE WIND       S0105600
C                DIRECTION DATA WAS RECORDED. THE VALUE OF ROTATE IS    S0105610
C                SUBTRACTED FROM EACH WIND DIRECTION CATEGORY. ROTATE IS S0105620
C                POSITIVE IF THE POSITIVE Y AXIS POINTS TO THE RIGHT OF S0105630
C                NORTH AS DEFINED BY THE WEATHER STATION AND NEGATIVE WHENS0105640
C                THE POSITIVE Y AXIS POINTS TO THE LEFT.                S0105650
C                     THE PROGRAM ASSUMES THAT THE METEOROLOGICAL DATA  S0105660
C                (WIND DIRECTION) RECORDED AT THE WEATHER STATION IS    S0105670
C                APPLICABLE AT THE SOURCE LOCATION. MOST WEATHER STATIONS S0105680
C                RECORD DIRECTION RELATIVE TO TRUE NORTH AND MOST GRID  S0105690
C                SYSTEMS ARE RELATIVE TO TRUE NORTH. HOWEVER, SOME WEATHERS0105700
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C              STATIONS RECORD DIRECTION RELATIVE TO MAGNETIC NORTH.    S0105710
C              ALSO, UTM (UNIVERSAL TRANSVERSE MERCATOR) COORDINATES    S0105720
C              ARE ORIENTED RELATIVE TO TRUE NORTH AT THE CENTER OF THE S0105730
C              UTM ZONE, BUT HAS AN INCREASING POS. OR NEG. DECLINATION S0105740
C              AS YOU APPROACH THE ENDS OF THE UTM ZONE. A ONE DEGREE   S0105750
C              ERROR AT 20 KILOMETERS DOWNWIND RESULTS IN AN ERROR OF   S0105760
C              349 METERS IN THE LATERAL LOCATION OF THE MAXIMUM.       S0105770
C     TK - (CARD COL. 11-20)                                            S0105780
C          MODEL UNITS CONVERSION FACTOR USED TO PRODUCE THE DESIRED    S0105790
C          OUTPUT CONCENTRATION (DEPOSITION) UNITS. THE DEFAULT FOR     S0105800
C          CONCENTRATION IS 10**6 MICROGRAMS/GRAM ASSUMING OUTPUT IN    S0105810
C          MICROGRAMS PER CUBIC METER AND SOURCE UNITS OF GRAMS/SEC. THES0105820
C          DEFAULT FOR DEPOSITION IS 1.0 ASSUMING OUTPUT IN GRAMS PER   S0105830
C          SQUARE METER AND SOURCES UNITS OF TOTAL GRAMS. IF THERE ARE  S0105840
C          ANY VARIATIONS FROM THE ABOVE THEN TK MUST BE INPUT. ALSO, IFS0105850
C          TK IS DEFAULTED THEN THE PARAMETER UNITS ABOVE IS            S0105860
C          AUTOMATICALLY FILLED AND CAN BE LEFT BLANK.                  S0105870
C     ZR - (CARD COL. 21-30)                                            S0105880
C          HEIGHT ABOVE GROUND AT AIRPORT OR WEATHER STATION AT WHICH   S0105890
C          THE WIND SPEED WAS MEASURED (METERS) (DEFAULT = 7.0)         S0105900
C     BETA1 - (CARD COL. 31-40)                                         S0105910
C             AIR ENTRAINMENT COEFFICIENT FOR AN ADIABATIC UNSTABLE     S0105920
C             ATMOSPHERE (DEFAULT = 0.6)                                S0105930
C     BETA2 - (CARD COL. 41-50)                                         S0105940
C             AIR ENTRAINMENT COEFFICIENT FOR A STABLE ATMOSPHERE       S0105950
C             (DEFAULT = 0.6)                                           S0105960
C     G - (CARD COL. 51-60)                                             S0105970
C         ACCELERATION OF GRAVITY (M/SEC**2) (DEFAULT = 9.8)            S0105980
C     DECAY - (CARD COL. 61-70)                                         S0105990
C             = THE WASHOUT COEFFICIENT (PER SEC) FOR PRECIPITATION     S0106000
C             SCAVENGING.                                               S0106010
C                 OR                                                    S0106020
C             = 0.0693/T WHERE T IS THE POLLUTANT HALF LIFE FOR PHYSICALS0106030
C             OR CHEMICAL REMOVAL.                                      S0106040
C                 OR                                                    S0106050
C             = 0 FOR NO DEPLETION.                                     S0106060
C                                                                       S0106070
C-CARD GROUP 14 (6F10.0 FORMAT) (NOT READ IF TAPE INPUT)                S0106080
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C      UBAR - ARRAY CONTAINING THE MEDIAN VALUE OF EACH WIND SPEED          S0106090
C             CATEGORY (M/SEC). IF ANY VALUE ON THIS CARD IS ZERO THE       S0106100
C             PROGRAM WILL DEFAULT THE VALUE 0.75, 2.5, 4.3, 6.8, 9.5,      S0106110
C             12.5 M/SEC DEPENDING ON THE RELATIVE POSITION ON THE CARD.    S0106120
C             (CARD COL. 1-10,11-20,---,51-60)                              S0106130
C                                                                           S0106140
C-CARD GROUP 15 (8F10.0 FORMAT) (NOT READ IF TAPE INPUT)                    S0106150
C      THETAP - ARRAY OF WIND DIRECTION SECTOR CATEGORY ANGLES (DEGREES).S0106160
C            IF THE FIRST TWO VALUES OF THIS ARRAY ARE ZERO THE PROGRAM     S0106170
C            DEFAULTS TO THE SET OF VALUES 0.0,22.5,45.0,...,337.5 DEG.     S0106180
C            (CARD COL. 1-10,11-20,---,71-80 ON EACH CARD)                  S0106190
C            (THIS VALUE IS THE DIRECTION FROM WHICH THE WIND IS COMING.    S0106200
C            ALSO, THIS ARRAY IS REFERED TO AS PHI IN THE REMAINDER OF      S0106210
C            THE PROGRAM)                                                   S0106220
C                                                                           S0106230
C-CARD GROUP 16 (6F10.0 FORMAT) (NOT READ IF TAPE INPUT)                    S0106240
C     P - ARRAY OF WIND SPEED POWER LAW EXPONENTS. THERE ARE NSPEED         S0106250
C         VALUES READ PER CARD AND NSTBLE CARDS READ. IF THE FIRST VALUES0106260
C         ON ANY CARD IS ZERO IT IS DEFAULTED TO A 0.1, B 0.15, C 0.2,      S0106270
C         D 0.25, E 0.3, F 0.3 DEPENDING ON THE STABILITY CATEGORY (DATAS0106280
C         CARD). ALSO, IF ANY OF THE SECOND THROUGH NSPEED VALUES ON ANYS0106290
C         CARD ARE ZERO THE PROGRAM SETS IT EQUAL TO THE LAST NON-ZERO      S0106300
C         VALUE ENCOUNTERED AS IT SCANS THE CARD FROM LEFT TO RIGHT.        S0106310
C         (CARD COL. 1-10,11-20,---,51-60 ON EACH CARD)                     S0106320
C                                                                           S0106330
C     NOTE THAT IF CARD GROUPS 17 THROUGH 17D ARE TO BE INPUT THEN          S0106340
C     INCLUDE CARD GROUPS 17 THROUGH 17D FOR SOURCE 1, FOLLOWED BY          S0106350
C     GROUPS 17 THROUGH 17D FOR SOURCE 2, ETC.                              S0106360
C-CARD GROUP 17 (I5,3I1,2F10.0,7F7.0,I1,I2) INITIAL CARD FOR EACH           S0106370
C         SOURCE INPUT VIA DATA CARDS. CARD GROUPS 17 THROUGH 17D ARE       S0106380
C         ALL INPUT SOURCE RELATED.                                         S0106390
C     NUMS - (CARD COL. 1-5)                                                S0106400
C             SOURCE IDENTIFICATION NUMBER. INPUT ALL SOURCES IN            S0106410
C             ASCENDING ORDER OF THE IDENTIFICATION NUMBER.                 S0106420
C             (DEFAULT = ORDER OF INPUT STARTING AT 1. DO NOT USE DEFAULTS0106430
C             IF TAPE INPUT) (NUMERIC ONLY).                                S0106440
C             IF A NEGATIVE VALUE IS INPUT IT INDICATES THE END OF THE      S0106450
C             SOURCE INPUT DATA.                                            S0106460
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C     DISP - (CARD COL. 6) - SOURCE DISPOSITION.                        S0106470
C              IF = 0 THE PROGRAM ASSUMES THIS IS A NEW SOURCE TO BE    S0106480
C                     MERGED INTO THE OLD TAPE SOURCES IF PRESENT OR THIS S0106490
C                     SOURCE IS TO REPLACE THE OLD TAPE SOURCE HAVING THE S0106500
C                     SAME SOURCE IDENTIFICATION NUMBER.                S0106510
C              IF = 1 THE PROGRAM ASSUMES THE OLD TAPE SOURCE HAVING THE S0106520
C                     SAME SOURCE IDENTIFICATION NUMBER IS TO BE DELETED. S0106530
C                     THE REMAINING PARAMETERS ON THIS CARD ARE NOT USED S0106540
C                     NOR ARE CARDS 19A THROUGH 19D READ.               S0106550
C              IF = 2 THE PROGRAM ASSUMES THE SOURCE STRENGTHS FOR THIS S0106560
C                     SOURCE ARE USED TO RESCALE THE CONCENTRATION      S0106570
C                     (DEPOSITION) CALCULATIONS OF THE OLD TAPE SOURCE  S0106580
C                     HAVING THE SAME SOURCE IDENTIFICATION NUMBER. THE S0106590
C                     REMAINING PARAMETERS ON THIS CARD ARE NOT USED AND S0106600
C                     THE PROGRAM READS ONLY CARD GROUP 19D. THIS OPTION S0106610
C                     CAN ONLY BE USED IF QFLG IN THE OLD SOURCE DATA   S0106620
C                     IS ZERO FOR THIS SOURCE. THIS OPTION CAN BE USED  S0106630
C                     TO CONVERT THE CONCENTRATION (DEP) CALCULATIONS   S0106640
C                     FROM ONE POLLUTANT TYPE TO ANOTHER WITHOUT HAVING S0106650
C                     TO TOTALLY RECALCULATE.                           S0106660
C     TYPE - (CARD COL. 7)                                              S0106670
C               SOURCE TYPE WHERE IF 0 A STACK IS ASSUMED, IF = 1 A VOLUME S0106680
C               SOURCE IS ASSUMED OR IF = 2 AN AREA SOURCE IS ASSUMED.  S0106690
C     QFLG - (CARD COL. 8)                                              S0106700
C               SPECIAL FLAG TO INDICATE HOW THE SOURCE STRENGTH VARIES. S0106710
C               IF = 0 THEN SOURCE STRENGTH VARIES WITH SEASON ONLY AND S0106720
C                      NSEASN VALUES ARE INPUT ON ONE DATA CARD UNDER   S0106730
C                      CARD GROUP 19D BELOW.                            S0106740
C               IF = 1 THEN SOURCE STRENGTH VARIES WITH SEASON AND      S0106750
C                      STABILITY. THERE ARE NSTBLE VALUES READ PER CARD S0106760
C                      AND NSEASN CARDS READ UNDER CARD GROUP 19D BELOW. S0106770
C               IF = 2 THEN SOURCE STRENGTH VARIES WITH SPEED AND       S0106780
C                      SEASON. THERE ARE NSPEED VALUES READ PER CARD    S0106790
C                      AND NSEASN CARDS READ UNDER CARD GROUP 19D BELOW. S0106800
C               IF = 3 THEN SOURCE STRENGTH VARIES WITH SEASON, STABILITY S0106810
C                      AND SPEED. THERE ARE NSPEED VALUES READ PER CARD S0106820
C                      AND NSTBLE CARDS READ FOR EACH SEASON 1 TO NSEASN S0106830
C                      UNDER CARD GROUP 19D BELOW.                      S0106840
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      C     DX - X COORDINATE OF THE SOURCE (METERS) (CARTESIAN COORDINATES   S0106850
      C          ONLY) (CARD COL. 9-18). IF THE SOURCE IS AN AREA SOURCE      S0106860
      C          ENTER THE X COORDINATE OF THE SOUTH-WEST CORNER              S0106870
      C     DY - Y COORDINATE OF THE SOURCE (METERS) (CARTESIAN COORDINATES   S0106880
      C          ONLY) (CARD COL. 19-28). IF THE SOURCE IS AN AREA SOURCE     S0106890
      C          ENTER THE Y COORDINATE OF THE SOUTH-WEST CORNER              S0106900
      C     H - HEIGHT ABOVE GROUND OF THE EMISSION (METERS) (CARD COL. 29-35)S0106910
      C         (IF THIS IS A VOLUME SOURCE H IS THE HEIGHT TO THE CENTER OF  S0106920
      C         THE SOURCE).                                                  S0106930
      C     ZS - ELEVATION OF GROUND AT SOURCE SITE (METERS) (CARD COL. 36-42)S0106940
      C          (NOT USED IF ISW(4) = 0)                                     S0106950
      C    - TYPE 0 SOURCES -                                                 S0106960
      C     TS - STACK GAS EXIT TEMP. (DEG K). IF TS IS LESS THAN OR EQUAL TO S0106970
      C          ZERO THE ABSOLUTE VALUE IS ADDED TO THE AMBIENT AIR TEMP. TO S0106980
      C          FORM THE STACK GAS EXIT TEMP. (CARD COL. 43-49)              S0106990
      C     VEL - STACK GAS EXIT VELOCITY (M/SEC) (CARD COL. 50-56)           S0107000
      C     D - INTERNAL STACK DIAMETER (METERS) (CARD COL. 57-63)            S0107010
      C     HB - HEIGHT ABOVE GROUND (METERS) OF THE TALLEST BUILDING WITHIN  S0107020
      C          2*HB OF THE STACK. (CARD COL. 64-70)                         S0107030
      C     BW - WIDTH (METERS) OF THE TALLEST BUILDING WITHIN 2*HB OF THE    S0107040
      C          STACK. IF THE BUILDING IS NOT SQUARE INPUT THE WIDTH OF A    S0107050
      C          SQUARE BUILDING OF EQUAL AREA. (CARD COL. 71-77)             S0107060
      C     WAKE - WAKE EFFECTS FLAG. IF THE EFFECTIVE BUILDING WIDTH TO      S0107070
      C            HEIGHT RATIO IS GREATER THAN 5 AND WAKE IS 0 OR BLANK      S0107080
      C            THE PROGRAM USES THE EQUATION OF LATERAL VIRTUAL DISTANCE  S0107090
      C            THAT WILL PRODUCE THE UPPER BOUND OF THE CONCENTRATION     S0107100
      C            (DEPOSITION) FOR THIS SOURCE. IF THE RATIO IS GREATER THAN S0107110
      C            5 AND WAKE IS SET EQUAL TO 1 THE PROGRAM USES THE EQUATION S0107120
      C            OF LATERAL VIRTUAL DISTANCE THAT WILL PRODUCE THE LOWER    S0107130
      C            BOUND OF THE CONCENTRATION (DEPOSITION) FOR THIS SOURCE.   S0107140
      C            (CARD COL. 78)                                             S0107150
      C    - TYPE 1 SOURCES -                                                 S0107160
      C     SIGYO - STANDARD DEVIATION OF THE CROSSWIND VOLUME SOURCE         S0107170
      C             DISTRIBUTION (METERS). (CARD COL. 43-49)                  S0107180
      C     SIGZO - STANDARD DEVIATION OF THE VERTICAL VOLUME SOURCE          S0107190
      C             DISTRIBUTION (METERS). (CARD COL. 50-56)                  S0107200
      C    - TYPE 2 SOURCES -                                                 S0107210
      C     XO - WIDTH OF THE AREA SOURCE (METERS) (CARD COL. 43-49)          S0107220
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C     - ALL SOURCE TYPES -                                              S0107230
C      NVS - NUMBER OF PARTICLE SIZE CATEGORIES FOR GRAVITATIONAL       S0107240
C            DEPOSITION OR CONCENTRATION WITH DEPLETION DUE TO          S0107250
C            GRAVITATIONAL DEPOSITION (MAX = 20).                       S0107260
C            (CARD COL. 79-80)                                          S0107270
C                                                                       S0107280
C-CARD GROUP 17A (8F10.0 FORMAT) (NOT READ IF NVS ON CARD GROUP 17 IS   S0107290
C      ZERO.                                                            S0107300
C      VS - ARRAY OF SETTLING VELOCITIES FOR THE PARTICLE SIZE CATORIES  S0107310
C           (M/SEC) (CARD COL. 1-10,11-20,---,71-80 ON EACH CARD)       S0107320
C                                                                       S0107330
C-CARD GROUP 17B (8F10.0 FORMAT) (NOT READ IF NVS ON CARD GROUP 17 IS   S0107340
C      ZERO                                                             S0107350
C      FRQ - ARRAY OF MASS FRACTION OF PARTICULATES FOR THE PARTICLE SIZES0107360
C            CATEGORIES (FRACTION).                                     S0107370
C            (CARD COL. 1-10,11-20,---,71-80 ON EACH CARD)              S0107380
C                                                                       S0107390
C-CARD GROUP 17C (8F10.0 FORMAT) (NOT READ IF NVS ON CARD GROUP 17 IS   S0107400
C      ZERO                                                             S0107410
C      GAMMA - ARRAY OF SURFACE REFLECTION COEFFICIENTS FOR THE PARTICLE S0107420
C              SIZE CATEGORIES. A VALUE OF 0 IS NO REFLECTION UP TO 1 AS S0107430
C              COMPLETE REFLECTION. (FRACTION 0 TO 1)                   S0107440
C              (CARD COL. 1-10,11-20,---,71-80 ON EACH CARD)            S0107450
C                                                                       S0107460
C-CARD GROUP 17D (6F10.0 FORMAT)                                        S0107470
C      Q - (CARD COL. 1-10,11-20,---,51-60 OR AS MANY AS ARE READ PER   S0107480
C          DATA CARD)                                                   S0107490
C          ARRAY OF SOURCE EMISSION STRENGTHS. SEE QFLG ABOVE FOR THE   S0107500
C          INPUT ORDER. NO DEFAULT VALUES OR LOGIC IS PROVIDED FOR      S0107510
C          SOURCE STRENGTHS BECAUSE ZERO IS A VALID SOURCE STRENGTH.    S0107520
C                 THE UNITS OF Q ARE...                                 S0107530
C            SOURCE TYPE             -  CALCULATING -                   S0107540
C                               CONCENTRATION           DEPOSITION      S0107550
C         STACK OR VOLUME       MASS PER UNIT TIME        TOTAL MASS    S0107560
C             AREA              MASS PER UNIT TIME PER    TOTAL MASS PER S0107570
C                                    UNIT AREA               UNIT AREA  S0107580
C          IF TK ABOVE IS DEFAULTED THEN THE PROGRAMS Q IS IN GRAMS/SEC S0107590
C          FOR CONCENTRATION AND GRAMS FOR TOTAL DEPOSITION.            S0107600
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      C                                                                 S0107610
      C *** REPEAT CARD GROUPS 19 TO 19D FOR EACH SOURCE INPUT           S0107620
      C                                                                 S0107630
      C*************** END OF INPUT DATA *******************************S0107640
      C     CARD READER IS IUNT, PRINTER IS JUNT                        S0107650
            IUNT = 5                                                    S0107660
            JUNT = 6                                                    S0107670
      C     INPUT TAPE IS UNIT MUNT, OUTPUT IS NUNT                     S0107680
            MUNT = 2                                                    S0107690
            NUNT = 3                                                    S0107700
      C     IEND IS TOTAL AMOUNT OF STORAGE IN ARRAY CORE               S0107710
            IEND = 40000                                                S0107720
      C     READ RUN TITLE                                              S0107730
      C***  CARD GROUP 1                                                S0107740
            READ (IUNT,9001) TITLE                                      S0107750
      C     READ PROGRAM OPTIONS                                        S0107760
      C***  CARD GROUP 2                                                S0107770
            READ (IUNT,9006) JSW                                        S0107780
            IF (JSW(14) .NE. 0) MUNT = IABS(JSW(14))                    S0107790
            IF (JSW(15) .NE. 0) NUNT = IABS(JSW(15))                    S0107800
         10 IF (JSW(5) .LE. 1) GO TO 70                                 S0107810
            READ (MUNT,END=10) (MSOR(I),I=1,68)                         S0107820
            DO 20 I=2,48                                                S0107830
         20 NSOR(I) = MSOR(I)                                           S0107840
            J1 = ISW(9)                                                 S0107850
            DO 30 I=5,20                                                S0107860
         30 ISW(I) = JSW(I)                                             S0107870
            IF (ISW(9) .EQ. 0) ISW(9) = J1                              S0107880
            IF (ISW(11) .GT. 0.AND.ISW(10) .EQ. 0) ISW(10) = 1          S0107890
            IF (ISW(12) .GT. 0.AND.ISW(10) .EQ. 0) ISW(10) = 1          S0107900
            DO 40 I=1,10                                                S0107910
            IF (TITLE(I) .NE. J5) GO TO 60                              S0107920
         40 CONTINUE                                                    S0107930
            DO 50 I=49,68                                               S0107940
         50 NSOR(I) = MSOR(I)                                           S0107950
         60 CONTINUE                                                    S0107960
      C     READ NO. OF CARD INPUT SOURCES WITH TAPE INPUT              S0107970
      C***  CARD GROUP 3 (WITH TAPE INPUT)                              S0107980
      READ (IUNT,9004) NSOURC,NGROUP,NXWY,NOFILE                        S0107990
      GO TO 90                                                          S0108000
   70 CONTINUE                                                          S0108010
      DO 80  I=1,20                                                     S0108020
   80 ISW(I) = JSW(I)                                                   S0108030
C     READ DATA SIZE PARAMETERS - NO TAPE INPUT                         S0108040
C***  CARD GROUP 3 (NO TAPE INPUT)                                      S0108050
      READ (IUNT,9002) NSOURC,NGROUP,NXPNTS,NYPNTS,NXWYPT,NSEASN,NSPEED,S0108060
     1NSTBLE,NSCTOR,NOFILE                                              S0108070
   90 CONTINUE                                                          S0108080
      IF (NOFILE .LE. 0) NOFILE = 1                                     S0108090
      LINE = 0                                                          S0108100
      IF (ISW(13) .LT. 0) LINE = 1                                      S0108110
      ISW(13) = IABS(ISW(13))                                           S0108120
C     DEFAULT SIZE PARAMETERS                                           S0108130
      IF (NSEASN .LE. 0) NSEASN = 1                                     S0108140
      IF (NSPEED .LE. 0) NSPEED = 6                                     S0108150
      IF (NSCTOR .LE. 0) NSCTOR = 16                                    S0108160
      DO 100  I=1,6                                                     S0108170
  100 ISTBLE(I) = I                                                     S0108180
      IF (ISW(9) .EQ. 0) ISW(9) = 3                                     S0108190
      IF (ISW(9) .EQ. 3) GO TO 120                                      S0108200
      IF (ISW(9) .EQ. 2) GO TO 110                                      S0108210
C     URBAN MODE 1                                                      S0108220
      ISTBLE(5) = 4                                                     S0108230
      ISTBLE(6) = 4                                                     S0108240
      GO TO 130                                                         S0108250
  110 CONTINUE                                                          S0108260
C     URBAN MODE 2                                                      S0108270
      ISTBLE(2) = 1                                                     S0108280
      ISTBLE(3) = 2                                                     S0108290
      ISTBLE(4) = 3                                                     S0108300
      ISTBLE(5) = 4                                                     S0108310
      ISTBLE(6) = 4                                                     S0108320
      GO TO 130                                                         S0108330
C     RURAL MODE 1                                                      S0108340
  120 CONTINUE                                                          S0108350
  130 IF (NSTBLE .LE. 0) NSTBLE = 6                                     S0108360
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C***  CARD GROUP 4                                                      S0108370
      IF (NGROUP .LE. 0) GO TO 150                                      S0108380
      READ (IUNT,9002) (NOCOMB(I),I=1,NGROUP)                           S0108390
      J = 0                                                             S0108400
      DO 140 I=1,NGROUP                                                 S0108410
  140 J = J+NOCOMB(I)                                                   S0108420
      READ (IUNT,9005) (IDSORC(I),I=1,J)                                S0108430
  150 CONTINUE                                                          S0108440
      IF (ISW(5) .GE. 2) GO TO 160                                      S0108450
C     READ CONCENTRATION (DEPOSITION) OUTPUT UNITS AND SOURCE STRENGTH  S0108460
C     INPUT UNITS                                                       S0108470
C***  CARD GROUP 5 (NOT READ IF TAPE INPUT)                             S0108480
      READ (IUNT,9001) UNITS                                            S0108490
  160 CONTINUE                                                          S0108500
C     DEFAULT OPTION SWITCHES                                           S0108510
      IF (ISW(7) .LE. 0) ISW(7) = 3                                     S0108520
      IF (ISW(8) .LE. 0) ISW(8) = 3                                     S0108530
      DO 170 I=1,3                                                      S0108540
      IF (ISW(I) .LE. 0) ISW(I) = 1                                     S0108550
  170 CONTINUE                                                          S0108560
      IF (ISW(13) .GT. 0) JUNT = ISW(13)                                S0108570
      NLINES = 57                                                       S0108580
      IF (ISW(17) .GT. 0) NLINES = ISW(17)                              S0108590
      LINE = 100                                                        S0108600
C     CALCULATE STARTING LOCATION OF EACH ARRAY IN BLANK COMMON         S0108610
C                                                                       S0108620
C     STARTING LOCATION OF X AXIS INCLUDING ANY SPECIAL CALCULATION     S0108630
C     RECEPTOR POINTS                                                   S0108640
      J1 = 1                                                            S0108650
C     STARTING LOCATION OF Y AXIS INCLUDING ANY SPECIAL CALCULATION     S0108660
C     RECEPTOR POINTS                                                   S0108670
      J2 = J1+NXPNTS+NXWYPT                                             S0108680
C     STARTING LOCATION OF Z ELEVATION POINTS FOR GRID AND SPECIAL      S0108690
C     POINTS                                                            S0108700
      J3 = J2+NYPNTS+NXWYPT                                             S0108710
C     STARTING LOCATION OF THE CONCENTRATION (DEPOSITION) ARRAYS        S0108720
      NXXYY = NXPNTS*NYPNTS                                             S0108730
      NXXYYP = NXXYY+NXWYPT                                             S0108740
      J4 = J3                                                           S0108750
      IF (ISW(4) .NE. 0) J4 = J3+NXXYYP                                 S0108760
      J5 = J4+NSEASH*NXXYYP-1                                           S0108770
      IF (ISW(8) .NE. 1.OR.ISW(11) .EQ. 2) J5 = J5+NSEASH*NXXYYP        S0108780
C     DETERMINE IF ENOUGH STORAGE                                       S0108790
      IF (J5 .LE. IEND) GO TO 180                                       S0108800
      WRITE (JUNT,9003) IEND,J5                                         S0108810
      GO TO 190                                                         S0108820
  180 CONTINUE                                                          S0108830
      IF (ISW(5) .EQ. 1.OR.ISW(5) .EQ. 3) WRITE (NUNT) (HSOR(I),I=1,68) S0108840
C     EXECUTE LONG TERM MODEL                                           S0108850
      CALL MODEL(CORE(J1),CORE(J2),CORE(J3),CORE(J4))                   S0108860
  190 STOP                                                              S0108870
 9001 FORMAT (20A4)                                                     S0108880
 9002 FORMAT (20I4)                                                     S0108890
 9003 FORMAT (////22H ERROR - MAX STORAGE =,I6,17H, USER REQUESTED ,I6,2S0108900
     18H, REDUCE NO. OF CALC. POINTS///)                                S0108910
 9004 FORMAT (2I4,8X,I4,16X,I4)                                         S0108920
 9005 FORMAT (13I6)                                                     S0108930
 9006 FORMAT (20I2)                                                     S0108940
      END                                                               S0108950
      SUBROUTINE MODEL(X,Y,Z,CON)                                       S0200010
      COMMON /DIM/ NSOURC,NXPNTS,NYPNTS,NXWYPT,NSEASH,NSPEED,NSTBLE,    S0200020
     1NSCTOR,ISW(20),UNITS(20),TITLE(20),NOFILE                         S0200030
      COMMON /MET/ FREQ(6,16,24),TA(6,4),HM(6,6,4),DPDZ(6,6),UBAR(6),   S0200040
     1P(6,6),PHI(16),ROTATE,G,ZR,BETA1,BETA2,DECAY,TK                   S0200050
C     NORMALLY THE ARRAY FREQ IN COMMON /MET/ WOULD BE DIMENSIONED 6,6, S0200060
C     6,4. HOWEVER, SOME FORTRAN COMPILERS LIMIT THE MAXIMUM NUMBER OF  S0200070
C     DIMENSIONS TO 3, SO THERE ARE ACTUALLY 2 DIMENSIONS IN THE THIRD  S0200080
C     SET TO 24.                                                        S0200090
      COMMON /REST/ IUNT,JUNT,NXXYY,NXXYYP,ISTBLE(6),IFLG3,LINE,NLINES, S0200100
     1ICARD,NXPSS,NYPSS,MUNT,NUNT,ICONT(3,2),ITSAVE(572),NT1,NT2,NT3,NT4S0200110
     2,MSG7(4,3),MSG8(2),MSG9(2,2),MSG10(4,3),NGROUP,NOCOMB(20),IDSORC(2S0200120
     300),IEND,XSEA,ISAVSO(300),NG,NGT,NXWY                             S0200130
      COMMON /DIST/ XB,YB,XYP,TNN,TR,TRI,ARG,RP,RPI                     S0200140
      COMMON /VERT/ SIGZI,SIGZ,HMP,HP,V,VSROU,BBAR                      S0200150
C     DATA CARD SOURCE INPUT DATA                                       S0200160
      COMMON /SORC1/ NUMS1,TYPE1,DX1,DY1,H1,ZS1,TS1,VEL1,D1,HB1,BW1,BL1,S0200170
     1NVS1,VS1(20),FRQ1(20),GAMMA1(20),Q1(6,6,4),QFLG1,WAKE1,DISP       S0200180
C     TAPE SOURCE INPUT DATA                                            S0200190
      COMMON /SORC2/ NUMS2,TYPE2,DX2,DY2,H2,ZS2,TS2,VEL2,D2,HB2,BW2,BL2,S0200200
     1NVS2,VS2(20),FRQ2(20),GAMMA2(20),Q2(6,6,4),QFLG2,WAKE2            S0200210
C     SOURCE FOR WHICH CONCENTRATION (DEPOSITION) IS CURRENTLY BEING    S0200220
C     CALCULATED.                                                       S0200230
      COMMON /SORC/ NUMS,TYPE,DX,DY,H,ZS,TS,VEL,D,HB,BW,BL,NVS,VS(20),FRS0200240
     1Q(20),GAMMA(20),Q(6,6,4),QFLG,WAKE                                S0200250
C     ARRAYS FOR STORAGE OF CONSTANTS USED TO CALCULATE SIGY, SIGZ, XY, S0200260
C     XZ                                                                S0200270
      COMMON /FUNCS/ AS(36),BS(36),PS(6),QS(6),CS(6),DS(6),ASI(36),BSI(3S0200280
     16),IA(7),JA(6),DST(31),IDP                                        S0200290
      DIMENSION X(1),Y(1),Z(1),CON(1),NSOR1(1),NSOR2(1),NSOR(1),        S0200300
     1MSG1(3,3),UBRS(6),UNIT(20),UNIS(20),STBLE(2),PP(6),DELH(6,6,16),  S0200310
     2XY(6),FFQ(1),UBHI(6,6),PHS(16),PHC(16),DLHSMX(6,6),MSG2(6,2)      S0200320
     3,FMT(20),NBRIG(6,6)                                               S0200330
C     THE FIRST DIMENSION OF THE ARRAY CON ABOVE CONTAINS NXPNTS*NYPNTS+S0200340
C     NXWYPT POINTS. THE VARIABLE IS SET UP THIS WAY TO ACCOMMODATE ANY S0200350
C     COMBINATION OF GRID SYSTEM POINTS AND SPECIAL DISCRETE POINTS.    S0200360
      EQUIVALENCE (NSOR1(1),NUMS1),(NSOR2(1),NUMS2),(NSOR(1),NUMS)      S0200370
     1,(FFQ(1),FREQ(1,1,1)),(SIGYO,TS),(SIGZO,VEL),(TS1,XOP)            S0200380
     2,(SIGY01,TS1),(FMT(1),GAMMA(1))                                   S0200390
      INTEGER TYPE1,TYPE2,TYPE,TITLE,UNITS,DISP,QFLG,UNIT,UNIS          S0200400
     1,QFLG1,QFLG2,QFLGS,WAKE,FMT                                       S0200410
      DATA MSG1/4HURBA,4HN MO,4HDE 1,4HURBA,4HN MO,4HDE 2,4HRURA,4HL MO,S0200420
     14HDE  /                                                           S0200430
C     DEFAULT WIND SPEEDS                                               S0200440
      DATA UBRS/0.75,2.5,4.3,6.8,9.5,12.5/                              S0200450
C     DEFAULT UNITS                                                     S0200460
      DATA UNIT/4H MIC,4HROGR,4HAMS ,4HPER ,4HCUBI,4HC ME,4HTER ,3*1H , S0200470
     14H GRA,4HMS P,4HER S,4HEC  ,6*1H /                                S0200480
      DATA UNIS/4H GRA,4HMS P,4HER S,4HQUAR,4HE ME,4HTER ,4*1H ,        S0200490
     14H GRA,4HMS  ,8*1H /                                              S0200500
C     DEFAULT VERTICAL POTENTIAL TEMPERATURE GRADIENTS                  S0200510
      DATA STBLE/0.02,0.035/                                            S0200520
C     DEFAULT WIND PROFILE POWER LAW EXPONENTS                          S0200530
      DATA PP/0.1,0.15,0.2,0.25,2*0.3/                                  S0200540
      DATA MSG7/1H ,4H   D,4HISTA,3HNCE,2*1H ,4H  RA,3HNGE,4HAZIM,4HUTH S0200550
     1,4HBEAR,3HING/                                                    S0200560
      DATA MSG8/1HX,1HY/                                                S0200570
      DATA MSG9/4HMETE,2HRS,4HDEGR,3HEES/                               S0200580
      DATA MSG2/4H AXI,4HS GR,4HID S,4HYSTE,4HM PO,4HINTS,4H SPE,4HCIAL,S0200590
     14H DIS,4HCRET,4HE PO,4HINTS/                                      S0200600
      DATA RADIAN/.01745329/                                            S0200610
      DATA AS/158.08,170.22,179.52,217.41,258.89,346.75,453.85,5000.0,  S0200620
     190.673,98.483,109.3,61.141,34.459,32.093,32.093,33.504,36.65,44.05S0200630
     23,23.331,21.628,21.628,22.534,24.703,26.97,35.42,47.618,15.209,14.S0200640
     3457,13.953,13.953,14.823,16.187,17.836,22.651,27.074,34.219/      S0200650
      DATA BS/1.0542,1.0932,1.1262,1.2644,1.4094,1.7283,2.1166,0.0,.9319S0200660
     18,.98332,1.0971,.91465,.86974,.81066,.64403,.60486,.56589,.51179, S0200670
     2.81956,.7566,.63077,.57154,.50527,.46713,.37615,.29592,.81558,    S0200680
     3.78407,.68465,.63227,.54503,.4649,.41507,.32681,.27436,.21716/    S0200690
      DATA PS/209.14,154.46,103.26,68.26,51.06,33.92/                   S0200700
      DATA QS/.89,.902,.917,.919,.921,.919/                             S0200710
      DATA CS/24.167,18.333,12.5,8.333,6.25,4.1667/                     S0200720
      DATA DS/2.5334,1.8096,1.0857,.72382,.54287,.36191/                S0200730
      DATA IA/1,8,10,11,16,23,32/                                       S0200740
      DATA JA/1,9,12,13,19,27/                                          S0200750
      DATA DST/0.15,0.2,0.25,0.3,0.4,0.5,3.11,0.2,0.4,0.1,0.3,1.0,3.0,10S0200760
     1.0,30.0,0.3,1.0,2.0,4.0,10.0,20.0,40.0,0.2,0.7,1.0,2.0,3.0,7.0,15.S0200770
     20,30.0,60.0/                                                      S0200780
      DATA ICONT/1H-,2*1H ,4H(CON,3HT.),1H-/,NT1/1/,NT2/1/,NT3/1/       S0200790
      DATA FMT/3H(6F,4H10.0,1H),17*1H /                                 S0200800
      NUMSL = 0                                                         S0200810
      INDFL = LINE                                                      S0200820
      DO 10 I=1,6                                                       S0200830
      PS(I) = 1.0/PS(I)                                                 S0200840
   10 QS(I) = 1.0/QS(I)                                                 S0200850
      DO 20 I=1,36                                                      S0200860
      ASI(I) = 1.0/AS(I)                                                S0200870
      IF (BS(I) .GT. 0.0) BSI(I) = 1.0/BS(I)                            S0200880
   20 CONTINUE                                                          S0200890
C     TOTAL X POINTS                                                    S0200900
      NXPS = NXPNTS+NXWYPT                                              S0200910
C     TOTAL Y POINTS                                                    S0200920
      NYPS = NYPNTS+NXWYPT                                              S0200930
C     NMET IS THE LENGTH OF COMMON /MET/                                S0200940
      NMET = 2573                                                       S0200950
C     NSO IS THE LENGTH OF COMMON /SORC/                                S0200960
      NSO = 219                                                         S0200970
C     COUNTERS FOR WARNING MESSAGES                                     S0200980
      IPR1 = 0                                                          S0200990
C                                                                       S0201000
      NT4 = 1                                                           S0201010
C     INPUT CALCULATION POINTS AND MET DATA                             S0201020
C***********************************************************************S0201030
      IF (ISW(5) .GE. 2) GO TO 210                                      S0201040
C     INPUT X AND Y AXES AND SPECIAL POINTS                             S0201050
      IF (NXPNTS .LE. 0) GO TO 60                                       S0201060
C***  CARD GROUP 6 (NOT READ IF TAPE INPUT)                             S0201070
      X(3) = 0.0                                                        S0201080
      X(4) = 0.0                                                        S0201090
      J = 8                                                             S0201100
      IF (J .GT. NXPNTS) J = NXPNTS                                     S0201110
      READ (IUNT,9002) (X(I),I=1,J)                                     S0201120
      IF (ABS(X(3))+ABS(X(4))) 50,30,50                                 S0201130
   30 IF (NXPNTS .LT. 3) GO TO 60                                       S0201140
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      A1 = X(2)                                                         S0201150
      DO 40  I=2,NXPNTS                                                 S0201160
   40 X(I) = X(I-1)+A1                                                  S0201170
      GO TO 60                                                          S0201180
   50 IF (NXPNTS .LE. 8) GO TO 60                                       S0201190
C***  CARD GROUP 6 (CONTINUED)                                          S0201200
      READ (IUNT,9002) (X(I),I=9,NXPNTS)                                S0201210
   60 CONTINUE                                                          S0201220
      IF (NXWYPT .LE. 0) GO TO 70                                       S0201230
C     X SPECIAL DISCRETE POINTS                                         S0201240
C***  CARD GROUP 6A (IF TAPE INPUT AND NXWYPT > 0 THIS CARD GROUP IS    S0201250
C     READ BELOW IN THE TAPE INPUT SECTION)                             S0201260
      READ (IUNT,9002) (X(I+NXPNTS),I=1,NXWYPT)                         S0201270
C     Y AXIS                                                            S0201280
   70 IF (NYPNTS .LE. 0) GO TO 110                                      S0201290
C***  CARD GROUP 7 (NOT READ IF TAPE INPUT)                             S0201300
      Y(3) = 0.0                                                        S0201310
      Y(4) = 0.0                                                        S0201320
      J = 8                                                             S0201330
      IF (J .GT. NYPNTS) J = NYPNTS                                     S0201340
      READ (IUNT,9002) (Y(I),I=1,J)                                     S0201350
      IF (ABS(Y(3))+ABS(Y(4))) 100,80,100                               S0201360
   80 IF (NYPNTS .LT. 3) GO TO 110                                      S0201370
      A1 = Y(2)                                                         S0201380
      DO 90  I=2,NYPNTS                                                 S0201390
   90 Y(I) = Y(I-1)+A1                                                  S0201400
      GO TO 110                                                         S0201410
  100 IF (NYPNTS .LE. 8) GO TO 110                                      S0201420
C***  CARD GROUP 7 (CONTINUED)                                          S0201430
      READ (IUNT,9002) (Y(I),I=9,NYPNTS)                                S0201440
  110 CONTINUE                                                          S0201450
      IF (NXWYPT .LE. 0) GO TO 120                                      S0201460
C     Y SPECIAL DISCRETE POINTS                                         S0201470
C***  CARD GROUP 7A (IF TAPE INPUT AND NXWYPT > 0 THIS CARD GROUP IS    S0201480
C     READ BELOW IN THE TAPE INPUT SECTION)                             S0201490
      READ (IUNT,9002) (Y(I+NYPNTS),I=1,NXWYPT)                         S0201500
  120 CONTINUE                                                          S0201510
C     INPUT ELEVATIONS (IF USED) FOR GRID SYSTEM AND SPECIAL POINTS     S0201520
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      IF (ISW(4) .EQ. 0) GO TO 155                                      S0201530
      IF (NXXYY .LE. 0) GO TO 140                                       S0201540
      DO 130 J=1,NYPNTS                                                 S0201550
      K = (J-1)*NXPNTS                                                  S0201560
C***  CARD GROUP 8 (NOT READ IF TAPE INPUT)                             S0201570
  130 READ (IUNT,9002) (Z(I+K),I=1,NXPNTS)                              S0201580
  140 IF (NXWYPT .LE. 0) GO TO 150                                      S0201590
C***  CARD GROUP 8A (IF TAPE INPUT AND NXWYPT > 0 AND ISW(4)=1 THIS      S0201600
C     CARD GROUP IS READ BELOW IN THE TAPE INPUT SECTION)               S0201610
      READ (IUNT,9002) (Z(I+NXXYY),I=1,NXWYPT)                          S0201620
  150 CONTINUE                                                          S0201630
      DO 151 I=1,NXXYYP                                                 S0201640
  151 Z(I)=Z(I)*.3048006                                                S0201650
C                                                                       S0201660
C     READ FREQUENCY OF OCCURRENCE OF WIND SPEED VERSUS DIRECTION       S0201670
C***  CARD GROUP 9 (NOT READ IF TAPE INPUT OR ISW(18)=0)                S0201680
      IF (ISW(18) .NE. 0) READ (IUNT,9001) (FMT(I),I=1,20)              S0201690
      DO 160 L=1,NSEASN                                                 S0201700
      DO 160 K=1,NSTBLE                                                 S0201710
      M = 4*(K-1)+L                                                     S0201720
      DO 160 J=1,NSCTOR                                                 S0201730
C***  CARD GROUP 9A (NOT READ IF TAPE INPUT)                            S0201740
  160 READ (IUNT,FMT) (FREQ(I,J,M),I=1,NSPEED)                          S0201750
C                                                                       S0201760
C     READ AMBIENT AIR TEMP IN DEGREES KELVIN                           S0201770
      DO 170 J=1,NSEASN                                                 S0201780
C***  CARD GROUP 10 (NOT READ IF TAPE INPUT)                            S0201790
  170 READ (IUNT,9002) (TA(I,J),I=1,NSTBLE)                             S0201800
C                                                                       S0201810
C     READ MIXING LAYER HEIGHTS IN METERS                               S0201820
      DO 180 K=1,NSEASN                                                 S0201830
      DO 180 J=1,NSTBLE                                                 S0201840
C***  CARD GROUP 11 (NOT READ IF TAPE INPUT)                            S0201850
  180 READ (IUNT,9002) (HM(I,J,K),I=1,NSPEED)                           S0201860
C                                                                       S0201870
C     READ VERTICAL GRADIENT OF POTENTIAL TEMP. IN DEGREES K/METER      S0201880
      DO 190 J=1,NSTBLE                                                 S0201890
C***  CARD GROUP 12 (NOT READ IF TAPE INPUT)                            S0201900
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  190 READ (IUNT,9002) (DPDZ(I,J),I=1,NSPEED)                           S0201910
C                                                                       S0201920
C     READ MISC. PARAMETERS                                             S0201930
C***  CARD GROUP 13 (NOT READ IF TAPE INPUT)                             S0201940
      READ (IUNT,9002) ROTATE,TK,ZR,BETA1,BETA2,G,DECAY                 S0201950
C                                                                       S0201960
C     READ WIND SPEED IN MPS                                            S0201970
C***  CARD GROUP 14 (NOT READ IF TAPE INPUT)                             S0201980
      READ (IUNT,9002) (UBAR(I),I=1,NSPEED)                             S0201990
C                                                                       S0202000
C     READ WIND DIRECTION SECTOR ANGLES (DEGREES)                       S0202010
C***  CARD GROUP 15 (NOT READ IF TAPE INPUT)                             S0202020
      READ (IUNT,9002) (PHI(I),I=1,NSCTOR)                              S0202030
C                                                                       S0202040
C     READ WIND SPEED POWER LAW EXPONENTS                               S0202050
      DO 200 J=1,NSTBLE                                                 S0202060
C***  CARD GROUP 16 (NOT READ IF TAPE INPUT)                             S0202070
  200 READ (IUNT,9002) (P(I,J),I=1,NSPEED)                              S0202080
      GO TO 230                                                         S0202090
C                                                                       S0202100
C   * TAPE INPUT SECTION *                                              S0202110
C                                                                       S0202120
  210 READ (MUNT) (X(I),I=1,NXPS)                                       S0202130
      READ (MUNT) (Y(I),I=1,NYPS)                                       S0202140
      IF (ISW(4) .NE. 0) READ (MUNT) (Z(I),I=1,NXXYYP)                  S0202150
      IF (ISW(12) .LE. 0.OR.NXWY .LE. 0) GO TO 220                      S0202160
      NXWYPT = NXWY                                                     S0202170
C***  CARD GROUP 6A FOR MAXIMUMS WITH TAPE INPUT                         S0202180
      READ (IUNT,9002) (X(I),I=1,NXWYPT)                                S0202190
C***  CARD GROUP 7A FOR MAXIMUMS WITH TAPE INPUT                         S0202200
      READ (IUNT,9002) (Y(I),I=1,NXWYPT)                                S0202210
C***  CARD GROUP 8A FOR MAXIMUMS WITH TAPE INPUT                         S0202220
      IF (ISW(4) .GT. 0) READ (IUNT,9002) (Z(I),I=1,NXWYPT)             S0202230
      NXPS = NXWYPT                                                     S0202240
      NYPS = NXWYPT                                                     S0202250
      NXXYY = 0                                                         S0202260
      NXXYYP = NXWYPT                                                   S0202270
      NXPNTS = 0                                                        S0202280
      NYPNTS = 0                                                        S0202290
  220 CONTINUE                                                          S0202300
      READ (NUNT) (FFQ(I),I=1,NMET)                                     S0202310
  230 IF (ISW(5) .EQ. 0.OR.ISW(5) .EQ. 2) GO TO 240                     S0202320
C                                                                       S0202330
C     WRITE OUTPUT TAPE                                                 S0202340
      WRITE (NUNT) (X(I),I=1,NXPS)                                      S0202350
      WRITE (NUNT) (Y(I),I=1,NYPS)                                      S0202360
      IF (ISW(4) .NE. 0) WRITE (NUNT) (Z(I),I=1,NXXYYP)                 S0202370
      WRITE (NUNT) (FFQ(I),I=1,NMET)                                    S0202380
  240 CONTINUE                                                          S0202390
C                                                                       S0202400
C     DEFAULT INPUT DATA                                                S0202410
C***********************************************************************S0202420
C     WIND SPEED                                                        S0202430
      DO 250 I=1,NSPEED                                                 S0202440
  250 IF (UBAR(I) .LE. 0.0) UBAR(I) = UBRS(I)                           S0202450
C     WIND PROFILE POWER LAW EXPONENT                                   S0202460
      DO 280 J=1,NSTBLE                                                 S0202470
      IF (P(1,J) .GT. 0.0) GO TO 260                                    S0202480
      P(1,J) = PP(J)                                                    S0202490
  260 C7 = P(1,J)                                                       S0202500
      DO 270 I=2,NSPEED                                                 S0202510
      IF (P(I,J) .GT. 0.0) C7 = P(I,J)                                  S0202520
      IF (P(I,J) .LE. 0.0) P(I,J) = C7                                  S0202530
  270 CONTINUE                                                          S0202540
  280 CONTINUE                                                          S0202550
C     TK AND UNITS                                                      S0202560
      IF (TK .GT. 0.0) GO TO 320                                        S0202570
      TK = 1.0E6                                                        S0202580
      IF (ISW(1) .EQ. 2) GO TO 300                                      S0202590
      DO 290 I=1,20                                                     S0202600
  290 UNITS(I) = UNIT(I)                                                S0202610
      GO TO 320                                                         S0202620
  300 TK = 1.0                                                          S0202630
      DO 310 I=1,20                                                     S0202640
  310 UNITS(I) = UNIS(I)                                                S0202650
  320 CONTINUE                                                          S0202660
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      IF (G .LE. 0.0) G = 9.8                                           S0202670
      IF (ZR .LE. 0.0) ZR = 10.0                                        S0202680
      ZRMIN = ZR                                                        S0202690
      IF (ZRMIN .GT. 10.0) ZRMIN = 10.0                                 S0202700
      IF (BETA1 .LE. 0.0) BETA1 = 0.6                                   S0202710
      IF (BETA2 .LE. 0.0) BETA2 = 0.6                                   S0202720
C     WIND DIRECTION                                                    S0202730
      IF (PHI(1) .GT. 0.0.OR.PHI(2) .GT. 0.0) GO TO 340                 S0202740
      DO 330 I=1,NSCTOR                                                 S0202750
  330 PHI(I) = 22.5*FLOAT(I-1)                                          S0202760
C     VERTICAL GRADIENT OF POTENTIAL TEMP.                              S0202770
  340 DO 370 J=1,NSTBLE                                                 S0202780
      IF (DPDZ(1,J) .GT. 0.0) GO TO 350                                 S0202790
      IF (J .LT. 5) GO TO 350                                           S0202800
      DPDZ(1,J) = STBLE(J-4)                                            S0202810
  350 C7 = DPDZ(1,J)                                                    S0202820
      DO 360 I=2,NSPEED                                                 S0202830
      IF (DPDZ(I,J) .GT. 0.0) C7 = DPDZ(I,J)                            S0202840
      IF (DPDZ(I,J) .LE. 0.0) DPDZ(I,J) = C7                            S0202850
  360 CONTINUE                                                          S0202860
  370 CONTINUE                                                          S0202870
C     TEMPERATURE                                                       S0202880
      DO 380 J=1,NSEASN                                                 S0202890
      C7 = TA(1,J)                                                      S0202900
      DO 380 I=2,NSTBLE                                                 S0202910
      IF (TA(I,J) .GT. 0.0) C7 = TA(I,J)                                S0202920
      IF (TA(I,J) .LE. 0.0) TA(I,J) = C7                                S0202930
  380 CONTINUE                                                          S0202940
C     MIXING LAYER HEIGHT                                               S0202950
      C8 = 0.0                                                          S0202960
      DO 390 K=1,NSEASN                                                 S0202970
      DO 390 J=1,NSTBLE                                                 S0202980
      IF (ISW(9) .EQ. 3.AND.ISTBLE(J) .GE. 5) HM(1,J,K) = 1.0E4         S0202990
      IF (HM(1,J,K) .LE. 0.0) HM(1,J,K) = C8                            S0203000
      C7 = HM(1,J,K)                                                    S0203010
      C8 = C7                                                           S0203020
      DO 390 I=2,NSPEED                                                 S0203030
      IF (HM(I,J,K) .GT. 0.0) C7 = HM(I,J,K)                            S0203040
      IF (HM(I,J,K) .LE. 0.0) HM(I,J,K) = C7                            S0203050
      IF (ISW(9) .EQ. 3.AND.ISTBLE(J) .GE. 5) HM(I,J,K) = 1.0E4         S0203060
  390 CONTINUE                                                          S0203070
      DO 430 L=1,NSEASN                                                 S0203080
      A1 = 0.0                                                          S0203090
      DO 400 K=1,NSTBLE                                                 S0203100
      M = 4*(K-1)+L                                                     S0203110
      DO 400 J=1,NSCTOR                                                 S0203120
      DO 400 I=1,NSPEED                                                 S0203130
  400 A1 = A1+FREQ(I,J,M)                                               S0203140
      IF (0.99 .LE. A1.AND.A1 .LE. 1.01) GO TO 410                      S0203150
      CALL TITLR(1,3,1)                                                 S0203160
      WRITE (JUNT,9006) L,A1                                            S0203170
  410 A1 = 1.0/A1                                                       S0203180
      DO 420 K=1,NSTBLE                                                 S0203190
      M = 4*(K-1)+L                                                     S0203200
      DO 420 J=1,NSCTOR                                                 S0203210
      DO 420 I=1,NSPEED                                                 S0203220
  420 FREQ(I,J,M) = FREQ(I,J,M)*A1                                      S0203230
  430 CONTINUE                                                          S0203240
C                                                                       S0203250
C     WRITE INPUT DATA                                                  S0203260
C***********************************************************************S0203270
      IF (ISW(6) .EQ. 0.OR.ISW(6) .EQ. 2) GO TO 630                     S0203280
      CALL TITLR(8,2,2)                                                 S0203290
      WRITE (JUNT,9004) NSOURC,NXPNTS,NYPNTS,NXWYPT,NSEASN,NSPEED,      S0203300
     1NSTBLE,NSCTOR,NOFILE                                              S0203310
      IF (ISW(9) .EQ. 0) GO TO 440                                      S0203320
      J = ISW(9)                                                        S0203330
      CALL TITLR(1,2,0)                                                 S0203340
      WRITE (JUNT,9005) (MSG1(I,J),I=1,3)                               S0203350
  440 CALL TITLR(8,2,0)                                                 S0203360
      WRITE (JUNT,9007) TK,G,ZR,BETA1,BETA2,ROTATE,DECAY                S0203370
      WRITE (JUNT,9008) ISW                                             S0203380
      IF (NGROUP .LE. 0) GO TO 480                                      S0203390
      LINE = 23                                                         S0203400
      KK = 0                                                            S0203410
      DO 470 J=1,NGROUP                                                 S0203420
      K = NOCOMB(J)                                                     S0203430
      IF (J .GT. 1) KK = KK+NOCOMB(J-1)                                 S0203440
      IF (K .EQ. 0) GO TO 460                                           S0203450
      J1 = 1                                                            S0203460
      J2 = K                                                            S0203470
      IF (J2 .GT. 10) J2 = 10                                           S0203480
      CALL TITLR(1,2,0)                                                 S0203490
      WRITE (JUNT,9031) J,(IDSORC(I+KK),I=J1,J2)                        S0203500
  450 J1 = J2                                                           S0203510
      J1 = J1+1                                                         S0203520
      IF (J1 .GT. K) GO TO 470                                          S0203530
      J2 = J1+9                                                         S0203540
      IF (J2 .GT. K) J2 = K                                             S0203550
      CALL TITLR(1,2,0)                                                 S0203560
      WRITE (JUNT,9032) (IDSORC(I+KK),I=J1,J2)                          S0203570
      GO TO 450                                                         S0203580
  460 CALL TITLR(1,2,0)                                                 S0203590
      WRITE (JUNT,9033) J                                               S0203600
  470 CONTINUE                                                          S0203610
      GO TO 490                                                         S0203620
  480 J = 1                                                             S0203630
      IF (ISW(8) .EQ. 1) GO TO 490                                      S0203640
      WRITE (JUNT,9033) J                                               S0203650
  490 CONTINUE                                                          S0203660
      IF (ISW(4) .EQ. 0) GO TO 500                                      S0203670
      KK = 3                                                            S0203680
      CALL OUTPT(KK,K,X,Y,Z,1)                                          S0203690
      LINE = NLINES                                                     S0203700
      GO TO 540                                                         S0203710
  500 CONTINUE                                                          S0203720
      IF (NXPNTS .LE. 0) GO TO 510                                      S0203730
      L = 1                                                             S0203740
      IF (ISW(2) .EQ. 2) L = 2                                          S0203750
      I = (NXPNTS-6)/10+1                                               S0203760
      CALL TITLR(I,2,0)                                                 S0203770
      WRITE (JUNT,9009) (MSG7(I,L),I=1,4),MSG8(1),(MSG2(I,1),I=1,6),    S0203780
     1(MSG9(I,1),I=1,2),(X(I),I=1,NXPNTS)                               S0203790
  510 IF (NXWYPT .LE. 0) GO TO 520                                      S0203800
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      L = 1                                                              S0203810
      IF (ISW(3) .EQ. 2) L = 2                                           S0203820
      I = (NXWYPT-6)/10+1                                                S0203830
      CALL TITLR(I,2,0)                                                  S0203840
      WRITE (JUNT,9009) (MSG7(I,L),I=1,4),MSG8(1),(MSG2(I,2),I=1,6),     S0203850
     1(MSG9(I,1),I=1,2),(X(I+NXPNTS),I=1,NXWYPT)                         S0203860
  520 IF (NYPNTS .LE. 0) GO TO 530                                       S0203870
      L = 1                                                              S0203880
      IF (ISW(2) .EQ. 2) L = 3                                           S0203890
      J = 1                                                              S0203900
      IF (ISW(2) .EQ. 2) J = 2                                           S0203910
      I = (NYPNTS-6)/10+1                                                S0203920
      CALL TITLR(I,2,0)                                                  S0203930
      WRITE (JUNT,9009) (MSG7(I,L),I=1,4),MSG8(2),(MSG2(I,1),I=1,6),     S0203940
     1(MSG9(I,J),I=1,2),(Y(I),I=1,NYPNTS)                                S0203950
  530 IF (NXWYPT .LE. 0) GO TO 540                                       S0203960
      L = 1                                                              S0203970
      IF (ISW(3) .EQ. 2) L = 3                                           S0203980
      J = 1                                                              S0203990
      IF (ISW(3) .EQ. 2) J = 2                                           S0204000
      I = (NXWYPT-6)/10+1                                                S0204010
      CALL TITLR(I,2,0)                                                  S0204020
      WRITE (JUNT,9009) (MSG7(I,L),I=1,4),MSG8(2),(MSG2(I,2),I=1,6),     S0204030
     1(MSG9(I,J),I=1,2),(Y(I+NYPNTS),I=1,NXWYPT)                         S0204040
  540 CONTINUE                                                           S0204050
      CALL TITLR(5+NSEASN,2,0)                                           S0204060
      WRITE (JUNT,9010) (I,I=1,6)                                        S0204070
      DO 550 K=1,NSEASN                                                  S0204080
  550 WRITE (JUNT,9011) K,(TA(I,K),I=1,NSTBLE)                           S0204090
  560 CALL TITLR(3+NSEASN*(3+NSTBLE),2,0)                                S0204100
      WRITE (JUNT,9012)                                                  S0204110
      DO 570 K=1,NSEASN                                                  S0204120
      WRITE (JUNT,9013) K,(I,I=1,6)                                      S0204130
      DO 570 I=1,NSTBLE                                                  S0204140
  570 WRITE (JUNT,9014) I,(HM(J,I,K),J=1,NSPEED)                         S0204150
      DO 600 K=1,NSEASN                                                  S0204160
      DO 600 I=1,NSTBLE                                                  S0204170
      M = 9+NSCTOR                                                       S0204180
      IF (K .EQ. 1.AND.I .EQ. 1) N = N+2                                S0204190
      CALL TITLR(N,2,0)                                                 S0204200
      IF (LINE .LE. N+4) GO TO 580                                      S0204210
      IF (K .NE. 1.OR.I .NE. 1) GO TO 590                               S0204220
  580 CONTINUE                                                          S0204230
      WRITE (JUNT,9015)                                                 S0204240
  590 WRITE (JUNT,9016) K                                               S0204250
      WRITE (JUNT,9017) I,(J,J=1,6),(UBAR(J),J=1,6)                     S0204260
      L = 4*(I-1)+K                                                     S0204270
      DO 600 N=1,NSCTOR                                                 S0204280
  600 WRITE (JUNT,9018) PHI(N),(FREQ(J,N,L),J=1,NSPEED)                 S0204290
      CALL TITLR(5+NSTBLE,2,0)                                          S0204300
      WRITE (JUNT,9019)                                                 S0204310
      WRITE (JUNT,9020) (J,J=1,NSPEED)                                  S0204320
      DO 610 I=1,NSTBLE                                                 S0204330
  610 WRITE (JUNT,9021) I,(DPDZ(J,I),J=1,NSPEED)                        S0204340
      CALL TITLR(5+NSTBLE,2,0)                                          S0204350
      WRITE (JUNT,9022)                                                 S0204360
      WRITE (JUNT,9020) (J,J=1,NSPEED)                                  S0204370
      DO 620 I=1,NSTBLE                                                 S0204380
  620 WRITE (JUNT,9021) I,(P(J,I),J=1,NSPEED)                           S0204390
  630 CONTINUE                                                          S0204400
C                                                                       S0204410
C     CALCULATE INTERNAL MODEL CONSTANTS                                S0204420
C***********************************************************************S0204430
      DO 640 N=1,NSCTOR                                                 S0204440
      A1 = (PHI(N)-ROTATE)*RADIAN                                       S0204450
      PHC(N) = COS(A1)                                                  S0204460
  640 PHS(N) = SIN(A1)                                                  S0204470
      C8 = ABS(PHI(2)-PHI(1))                                           S0204480
      TR = C8*RADIAN                                                    S0204490
      TRI = 1.0/TR                                                      S0204500
      THN = TAN(TR)                                                     S0204510
      THNI = 1.0/TAN(0.5*TR)                                            S0204520
      ZRI = 1.0/ZR                                                      S0204530
      A1 = 1.5/(BETA1*BETA1)                                            S0204540
      A2 = 3.0/(BETA2*BETA2)                                            S0204550
      NXPSS = NXPNTS-NXXYY                                              S0204560
      NYPSS = NYPNTS-NXXYY                                              S0204570
      PP1 = TK*.398942281*TRI                                           S0204580
      IF (ISW(1) .LE. 1) PP1 = PP1*2.0                                  S0204590
      XYPU = 2.15*TNNI                                                  S0204600
      XSEA = 1.0/FLOAT(NSEASN)                                          S0204610
C                                                                       S0204620
C*** START SECTION THAT LOOPS OVER SOURCE COMBINATIONS.                 S0204630
C***********************************************************************S0204640
C                                                                       S0204650
C     SAVE SPECIAL OPTIONS FOR MAXIMA                                   S0204660
      IF (ISW(10) .NE. 0) GO TO 650                                     S0204670
      ISW(11) = 0                                                       S0204680
      ISW(12) = 0                                                       S0204690
  650 ISW11 = ISW(11)                                                   S0204700
      ISW12 = ISW(12)                                                   S0204710
      ISW10 = ISW(10)                                                   S0204720
      ISW8 = ISW(8)                                                     S0204730
      NOTAP = 0                                                         S0204740
C     NOTAP = 0 MEANS ALL TAPE DATA, NOT ENOUGH CORE TO HOLD ALL SOURCESS0204750
C     NOTAP > 0 MEANS ALL SOURCES IN COMBINED REPORTS SAVED IN CORE.    S0204760
      L91 = -1                                                          S0204770
      IF (ISW(8) .NE. 1.OR.ISW(11) .EQ. 2) L91 = NSEASN-1               S0204780
C     L91 MAKES ROOM FOR SUM OF COMBINED SOURCES IN ARRAY CON           S0204790
C     L92 IF=1 MAKES ROOM FOR ANNUAL SUM                                S0204800
      NXYSEA = NXXYYP*NSEASN                                            S0204810
      L92 = 2                                                           S0204820
      IF (ISW(4) .GT. 0.AND.ISW(11) .EQ. 2) GO TO 660                   S0204830
      L92 = 0                                                           S0204840
      IF (ISW(7) .EQ. 1.OR.NSEASN .EQ. 1) GO TO 660                     S0204850
      IF (NGROUP .EQ. 0) GO TO 660                                      S0204860
      L92 = 1                                                           S0204870
  660 CONTINUE                                                          S0204880
      IF (NGROUP .EQ. 0.AND.ISW(11) .NE. 2) GO TO 690                   S0204890
C     SEE IF CAN DO ALL COMBINATIONS IN CORE (NOTAP > 0)                S0204900
      I = NXPS+NYPS                                                     S0204910
      IF (ISW(4) .NE. 0) I = I+NXXYYP                                   S0204920
      IF (L92 .EQ. 1) I = I+NXXYYP                                      S0204930
      IF (L91 .NE. -1) I = I+NXYSEA                                     S0204940
      NOTAP = I                                                         S0204950
      IF (ISW(5) .EQ. 1.OR.ISW(5) .EQ. 3.OR.NSOURC .EQ. 0) GO TO 690    S0204960
      J = IEND-I                                                        S0204970
      IF (NSOURC .LE. J/NXYSEA.AND.NSOURC .LE. 300) GO TO 690           S0204980
      IF (NSOURC .GT. 300) GO TO 680                                    S0204990
      I = I+NSOURC*NSEASN*NXXYYP                                        S0205000
C     ERROR WILL EXCEED CORE                                            S0205010
  670 WRITE (JUNT,9034) IEND,I                                          S0205020
      GO TO 2490                                                        S0205030
  680 WRITE (JUNT,9035)                                                 S0205040
      GO TO 2490                                                        S0205050
  690 CONTINUE                                                          S0205060
      IF (L92 .EQ. 1.AND.NOTAP .EQ. 0) L92 = 0                          S0205070
      IF (L92 .EQ. 1) L91 = L91+1                                       S0205080
      IF (NGROUP .EQ. 0) NGROUP = 1                                     S0205090
C     START ACTUAL COMBINATIONS LOOP                                    S0205100
      NGT = 0                                                           S0205110
      NG = 0                                                            S0205120
  700 NG = NG+1                                                         S0205130
      IF (NG .GT. NGROUP) GO TO 2500                                    S0205140
      IF (ISW(16) .EQ. 0.OR.NG .EQ. 1) LINE = NLINES                    S0205150
      IF (NG .GT. 1) NGT = NGT+NOCOMB(NG-1)                             S0205160
C     EACH COMBINATION MAY BE 1 OR 2 PASSES. IF ISW(11)=2 INITIALLY THENS0205170
C     EACH COMBINATION TAKES TWO PASSES, ONE FOR DETERMINATION OF THE   S0205180
C     MAXIMA AND THE SECOND FOR DISPLAY.                                S0205190
C                                                                       S0205200
C     START FIRST PASS FOR COMBINATION NG                               S0205210
      ISW(10) = ISW10                                                   S0205220
      ISW(11) = ISW11                                                   S0205230
      ISW(12) = ISW12                                                   S0205240
      IF (ISW(11) .EQ. 2) ISW(10) = 1                                   S0205250
      ISW(8) = ISW8                                                     S0205260
      IF (ISW(8).GE.2.AND.NOCOMB(NG).EQ.1.AND.IDSORC(NGT+1).GT.0) ISW(8)S0205270
     1= 1                                                               S0205280
      GO TO 720                                                         S0205290
C     START SECOND PASS HERE                                            S0205300
  710 CONTINUE                                                          S0205310
      ISW(11) = 0                                                       S0205320
      ISW(12) = -1                                                      S0205330
      ISW(10) = ISW10                                                   S0205340
  720 IF (NG .EQ. 1.AND.ISW(12) .NE. -1) GO TO 760                      S0205350
      IF (NOTAP .NE. 0) GO TO 760                                       S0205360
C     REWIND AND POSITION INPUT TAPE FOR ADDITIONAL PASSES              S0205370
      REWIND MUNT                                                       S0205380
      IF (ISW(14) .LT. 0) GO TO 750                                     S0205390
      K = 0                                                             S0205400
  730 K = K+1                                                           S0205410
      IF (K .GE. NOFILE) GO TO 750                                      S0205420
  740 READ (MUNT,END=730) (CON(I),I=1,5)                                S0205430
      GO TO 740                                                         S0205440
  750 CONTINUE                                                          S0205450
      READ (MUNT) (CON(I),I=1,68)                                       S0205460
      READ (MUNT) (CON(I),I=1,NXPS)                                     S0205470
      READ (MUNT) (CON(I),I=1,NYPS)                                     S0205480
      IF (ISW(4) .GT. 0) READ (MUNT) (CON(I),I=1,NXXYYP)                S0205490
      READ (MUNT) (CON(I),I=1,NMET)                                     S0205500
  760 KSO = 0                                                           S0205510
      L9 = 0                                                            S0205520
      IF (ISW8 .EQ. 1.AND.ISW11 .NE. 2) GO TO 780                       S0205530
C     ZERO SOURCE COMBINATION ARRAYS                                    S0205540
      DO 770 K=1,NSEASN                                                 S0205550
      L1 = (K-1)*NXXYYP                                                 S0205560
      IF (L92 .EQ. 1) L1 = L1+NXXYYP                                    S0205570
      DO 770 I=1,NXXYYP                                                 S0205580
  770 CON(L1+I) = 0.0                                                   S0205590
  780 CONTINUE                                                          S0205600
C                                                                       S0205610
C**** START LOOP  OVER CARD AND/OR TAPE INPUT SOURCE DATA                S0205620
C***********************************************************************S0205630
C                                                                       S0205640
      IF (NG .GT. 1.OR.ISW(12) .EQ. -1) GO TO 790                       S0205650
C     M1 - COUNTER FOR CARD SOURCES                                     S0205660
      M1 = 0                                                            S0205670
C     N1 - COUNTER FOR TAPE SOURCES                                     S0205680
      N1 = 0                                                            S0205690
C     K1 - COUNTER FOR TOTAL SOURCES                                    S0205700
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      K1 = 0                                                            S0205710
C     NT - COUNTER FOR SOURCE TO OUTPUT TAPE SUMMARY TABLE              S0205720
      NT = 0                                                            S0205730
C     NTT - MAX. NO. SOURCES IN OUTPUT TAPE SUMMARY BUFFER              S0205740
      NTT = 572                                                         S0205750
C     IFLG1 - FLAG FOR END OF CARDS                                     S0205760
      IFLG1 = 0                                                         S0205770
C     IFLG2 - FLAG FOR END OF TAPE                                      S0205780
      IFLG2 = 0                                                         S0205790
C     IFLG3 - FLAG FOR READ CARD ONLY =2, READ TAPE ONLY = 3, BOTH = 1  S0205800
      IFLG3 =1                                                          S0205810
      IF (ISW(5) .LE. 1) IFLG2 = 1                                      S0205820
      IF (NSOURC .LE. 0) IFLG1 = 1                                      S0205830
  790 CONTINUE                                                          S0205840
      IF (NG .EQ. 1.AND.ISW(12) .NE. -1) GO TO 830                      S0205850
      IF (NOTAP .EQ. 0) GO TO 800                                       S0205860
C     ALL SAVED IN CORE                                                 S0205870
      IF (KSO+1 .GT. NSOURC) GO TO 2410                                 S0205880
      NUMS = ISAVSO(KSO+1)                                              S0205890
      GO TO 2260                                                        S0205900
C     NOT SAVED IN CORE REREAD TAPE                                     S0205910
  800 READ (MUNT,END=2410) (NSOR(I),I=1,NSO)                            S0205920
      IF (NSOR(1) .NE. 999999) GO TO 810                                S0205930
      IF (ISW(14) .GE. 0) GO TO 800                                     S0205940
      GO TO 2410                                                        S0205950
  810 CONTINUE                                                          S0205960
      DO 820 K=1,NSEASN                                                 S0205970
      L1 = (K+L91)*NXXYYP+L9                                            S0205980
      READ (MUNT,END=2410) (CON(L1+I),I=1,NXXYYP)                       S0205990
  820 CONTINUE                                                          S0206000
      GO TO 2260                                                        S0206010
  830 CONTINUE                                                          S0206020
C     INITIAL CALCULATION PASS                                          S0206030
      IPR4 = 0                                                          S0206040
      IF (IFLG3 .EQ. 3) GO TO 1130                                      S0206050
C     HAS END OF CARD DATA OCCURRED                                     S0206060
      IF (IFLG1 .EQ. 1) GO TO 1130                                      S0206070
      M1 = M1+1                                                         S0206080
      IF (M1 .GT. NSOURC) GO TO 1120                                    S0206090
C                                                                       S0206100
C     READ DATA CARD SOURCE DATA                                        S0206110
      READ (IUNT,9023,END=1120) NUMS1,DISP,TYPE1,QFLG1,DX1,DY1,H1,ZS1,TSS0206120
     11,VEL1,D1,HB1,BW1,WAKE1,NVS1                                      S0206130
      IF (NUMS1 .LT. 0) GO TO 1120                                      S0206140
      IF (NUMS1 .EQ. 0) NUMS1 = M1                                      S0206150
      IF (NUMS1 .GT. NUMSL) GO TO 840                                   S0206160
      WRITE (JUNT,9041) NUMS1,NUMSL                                     S0206170
      GO TO 2490                                                        S0206180
  840 NUMSL = NUMS1                                                     S0206190
      IF (DISP .LT. 3) GO TO 850                                        S0206200
      WRITE (JUNT,9042) NUMS1                                           S0206210
      GO TO 2490                                                        S0206220
  850 IF (TYPE1 .LT. 3) GO TO 860                                       S0206230
      WRITE (JUNT,9043) NUMS1                                           S0206240
      GO TO 2490                                                        S0206250
  860 IF (QFLG1 .LT. 4) GO TO 870                                       S0206260
      WRITE (JUNT,9044) NUMS1                                           S0206270
      GO TO 2490                                                        S0206280
  870 CONTINUE                                                          S0206290
      IF (DISP .NE. 0) GO TO 990                                        S0206300
      IF (TYPE1 .GT. 0) GO TO 910                                       S0206310
      IF (VEL1) 880,880,890                                             S0206320
  880 WRITE (JUNT,9036) NUMS1                                           S0206330
      VEL1 = 1.0E-5                                                     S0206340
      LINE = LINE+1                                                     S0206350
  890 IF (D1) 900,900,970                                               S0206360
  900 WRITE (JUNT,9037) NUMS1                                           S0206370
      GO TO 2490                                                        S0206380
  910 IF (TYPE1 .GT. 1) GO TO 950                                       S0206390
      IF (SIGY01) 920,920,930                                           S0206400
  920 WRITE (JUNT,9038) NUMS1                                           S0206410
      GO TO 2490                                                        S0206420
  930 IF (VEL1) 940,940,970                                             S0206430
  940 WRITE (JUNT,9039) NUMS1                                           S0206440
      GO TO 2490                                                        S0206450
  950 IF (XOP) 960,960,970                                              S0206460
  960 WRITE (JUNT,9040) NUMS1                                           S0206470
      GO TO 2490                                                        S0206480
  970 CONTINUE                                                          S0206490
      IF (TYPE1 .EQ. 0) GO TO 990                                       S0206500
      IF (TYPE1 .EQ. 2) GO TO 980                                       S0206510
C     VOLUME                                                            S0206520
      BW1 = 4.3*SIGY01                                                  S0206530
      GO TO 990                                                         S0206540
C     AREA                                                              S0206550
  980 BW1 = XOP                                                         S0206560
      XOP = 0.0                                                         S0206570
  990 CONTINUE                                                          S0206580
      IF (DISP .EQ. 1) GO TO 1130                                       S0206590
      IF (DISP .EQ. 2) GO TO 1010                                       S0206600
      IF (NVS1 .GT. 0) GO TO 1000                                       S0206610
      IF (ISW(1) .LE. 1) GO TO 1010                                     S0206620
      WRITE (JUNT,9003) NUMS1                                           S0206630
      GO TO 2490                                                        S0206640
 1000 CONTINUE                                                          S0206650
C     READ PARAMETERS FOR GRAVITATIONAL DEPOSITION                      S0206660
      READ (IUNT,9002) (VS1(I),I=1,NVS1)                                S0206670
      READ (IUNT,9002) (FRQ1(I),I=1,NVS1)                               S0206680
      READ (IUNT,9002) (GAMMA1(I),I=1,NVS1)                             S0206690
 1010 QFLGS = QFLG1+1                                                   S0206700
      IF (DISP .NE. 2.OR.QFLGS .LE. 1) GO TO 1020                       S0206710
      WRITE (JUNT,9027) NUMS1                                           S0206720
      GO TO 2490                                                        S0206730
 1020 CONTINUE                                                          S0206740
      GO TO (1030,1040,1060,1080),QFLGS                                 S0206750
C     SOURCE STRENGTH VARIES WITH SEASON ONLY                           S0206760
 1030 READ (IUNT,9002) (Q1(1,1,K),K=1,NSEASN)                           S0206770
      L1 = 1                                                            S0206780
      L2 = 1                                                            S0206790
      GO TO 1100                                                        S0206800
 1040 DO 1050 K=1,NSEASN                                                S0206810
C     SOURCE STRENGTH VARIES WITH SEASON AND STABILITY OR SPEED         S0206820
 1050 READ (IUNT,9002) (Q1(1,J,K),J=1,NSTBLE)                           S0206830
      L1 = 1                                                            S0206840
      L2 = 0                                                              S0206850
      GO TO 1100                                                          S0206860
 1060 DO 1070 K=1,NSEASN                                                  S0206870
C     SOURCE STRENGTH VARIES WITH SEASON, STABILITY AND SPEED             S0206880
 1070 READ (IUNT,9002) (Q1(I,1,K),I=1,NSPEED)                             S0206890
      L1 = 0                                                              S0206900
      L2 = 1                                                              S0206910
      GO TO 1100                                                          S0206920
 1080 DO 1090 K=1,NSEASN                                                  S0206930
      DO 1090 J=1,NSTBLE                                                  S0206940
 1090 READ (IUNT,9002) (Q1(I,J,K),I=1,NSPEED)                             S0206950
      GO TO 1130                                                          S0206960
 1100 DO 1110 K=1,NSEASN                                                  S0206970
      DO 1110 J=1,NSTBLE                                                  S0206980
      L4 = 1                                                              S0206990
      IF (L2 .EQ. 0) L4 = J                                               S0207000
      DO 1110 I=1,NSPEED                                                  S0207010
      L3 = 1                                                              S0207020
      IF (L1 .EQ. 0) L3 = I                                               S0207030
 1110 Q1(I,J,K) = Q1(L3,L4,K)                                             S0207040
      GO TO 1130                                                          S0207050
 1120 IFLG1 = 1                                                           S0207060
      DISP = 0                                                            S0207070
 1130 IF (IFLG3 .EQ. 2) GO TO 1160                                        S0207080
C     HAS END OF TAPE DATA OCCURRED                                       S0207090
      IF (IFLG2 .EQ. 1) GO TO 1160                                        S0207100
C                                                                         S0207110
C     READ TAPE SOURCE DATA                                               S0207120
 1140 READ (MUNT,END=1150) (NSOR2(I),I=1,NSO)                             S0207130
      IF (NSOR2(1) .NE. 999999) GO TO 1160                                S0207140
      IF (ISW(14) .GE. 0) GO TO 1140                                      S0207150
 1150 IFLG2 = 1                                                           S0207160
 1160 IF (IFLG1 .EQ. 1.AND.IFLG2 .EQ. 1) GO TO 1350                       S0207170
      IF (IFLG1 .EQ. 1) GO TO 1300                                        S0207180
      IF (IFLG2 .EQ. 1) GO TO 1270                                        S0207190
C     CARD AND TAPE INPUT, COMPARE SOURCE NUMBERS                         S0207200
      IF (NUMS1 .LT. NUMS2) GO TO 1330                                    S0207210
      IF (NUMS2 .LT. NUMS1) GO TO 1300                                    S0207220
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C      SAME SOURCE, IF DISP = 1 THEN DELETION ONLY                    S0207230
C      IF DISP = 2 RESCALE CON (DEP)                                  S0207240
       IFLG3 = 1                                                      S0207250
       L3 = 1                                                         S0207260
 1170  CONTINUE                                                       S0207270
       IF (NOTAP .EQ. 0) GO TO 1200                                   S0207280
       IF (L9+NOTAP+NXYSEA .LE. IEND) GO TO 1200                      S0207290
       IF (ISW(5) .EQ. 1.OR.ISW(5) .EQ. 3) GO TO 1190                 S0207300
       IF (ISW(5) .EQ. 2.AND.NSOURC .EQ. 0) GO TO 1190                S0207310
 1180  CONTINUE                                                       S0207320
       I = L9+NOTAP+NXYSEA                                            S0207330
       GO TO 670                                                      S0207340
 1190  NOTAP = 0                                                      S0207350
       L9 = 0                                                         S0207360
 1200  CONTINUE                                                       S0207370
       DO 1210 K=1,NSEASN                                             S0207380
       L1 = (K+L91)*NXXYYP+L9                                         S0207390
       READ (MUNT,END=1150) (CON(L1+I),I=1,NXXYYP)                    S0207400
 1210  CONTINUE                                                       S0207410
       GO TO (1220,1370 ),L3                                          S0207420
 1220  CONTINUE                                                       S0207430
       IF (DISP .EQ. 1) GO TO 790                                     S0207440
       IF (DISP .NE. 2) GO TO 1250                                    S0207450
C      RESCALE                                                        S0207460
       DO 1240 K=1,NSEASN                                             S0207470
       L1 = (K+L91)*NXXYYP+L9                                         S0207480
       C8 = Q1(1,1,K)/Q2(1,1,K)                                       S0207490
       DO 1230 J=1,NSTBLE                                             S0207500
       DO 1230 I=1,NSPEED                                             S0207510
 1230  Q2(I,J,K) = Q1(1,1,K)                                          S0207520
       DO 1240 I=1,NXXYYP                                             S0207530
       CON(L1+I) = CON(L1+I)*C8                                       S0207540
 1240  CONTINUE                                                       S0207550
       GO TO 1310                                                     S0207560
 1250  CONTINUE                                                       S0207570
C      REPLACE TAPE SOURCE WITH CARD SOURCE                           S0207580
 1260  IF (DISP .LE. 0) GO TO 1280                                    S0207590
       WRITE (JUNT,9028) NUMS1                                        S0207600
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      GO TO 2490                                                        S0207610
 1270 IF (DISP .LE. 0) GO TO 1340                                       S0207620
      WRITE (JUNT,9028) NUMS1                                           S0207630
      GO TO 2490                                                        S0207640
 1280 K1 = K1+1                                                         S0207650
      ICARD = 1                                                         S0207660
      DO 1290 I=1,NSO                                                   S0207670
 1290 NSOR(I) = NSOR1(I)                                                S0207680
      GO TO 1370                                                        S0207690
C     STORE TAPE SOURCE, HOLD CARD SOURCE                               S0207700
 1300 IFLG3 = 3                                                         S0207710
 1310 CONTINUE                                                          S0207720
      ICARD = 0                                                         S0207730
      K1 = K1+1                                                         S0207740
      DO 1320  I=1,NSO                                                  S0207750
 1320 NSOR(I) = NSOR2(I)                                                S0207760
      IF (IFLG3 .NE. 3) GO TO 1370                                      S0207770
      L3 = 2                                                            S0207780
      GO TO 1170                                                        S0207790
C     STORE CARD SOURCE, HOLD TAPE SOURCE                               S0207800
 1330 IF (DISP .LE. 0) GO TO 1340                                       S0207810
      WRITE (JUNT,9029) NUMS1                                           S0207820
      GO TO 2490                                                        S0207830
 1340 IFLG3 =2                                                          S0207840
      GO TO 1280                                                        S0207850
C     SAVE NO. OF SOURCES USED, FOR CORE SAVED RUN                      S0207860
 1350 NSOURC = KSO                                                      S0207870
      IF (ISW(5) .EQ. 0.OR.ISW(5) .EQ. 2) GO TO 2410                    S0207880
C     WRITE END OF TAPE RECORD                                          S0207890
      NSOR(1) = 999999                                                  S0207900
      WRITE (NUNT) (NSOR(I),I=1,NSO)                                    S0207910
      IF (ISW(15) .LT. 0) GO TO 1360                                    S0207920
      ENDFILE NUNT                                                      S0207930
      ENDFILE NUNT                                                      S0207940
      BACKSPACE NUNT                                                    S0207950
C     THIS BACKSPACE ASSUMES THE TAPE BACKSPACES OVER THE SECOND END OF S0207960
C     FILE MARK.                                                        S0207970
 1360 CONTINUE                                                          S0207980
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      C     SWITCH OUTPUT UNIT TO INPUT UNIT FOR ADDITIONAL PASSES          S0207990
            NUNT = NUNT                                                      S0208000
            ISW(14) = ISW(15)                                                S0208010
            ISW(5) = 2                                                       S0208020
            GO TO 2410                                                       S0208030
       1370 CONTINUE                                                         S0208040
            IF (NOTAP .EQ. 0) GO TO 1400                                     S0208050
            IF (KSO+1 .LE. 300) GO TO 1390                                   S0208060
            IF (ISW(5) .EQ. 1.OR.ISW(5) .EQ. 3) GO TO 1380                   S0208070
            IF (ISW(5) .EQ. 2.AND.NSOURC .EQ. 0) GO TO 1380                  S0208080
            GO TO 680                                                        S0208090
       1380 NOTAP = 0                                                        S0208100
            GO TO 1400                                                       S0208110
       1390 ISAVSO(KSO+1) = NUMS                                             S0208120
       1400 CONTINUE                                                         S0208130
      C     PRINT SOURCE DATA                                                S0208140
            IF (ISW(6) .LE. 1) GO TO 1410                                    S0208150
            CALL OUTPT(4,K,X,Y,CON,1)                                        S0208160
       1410 CONTINUE                                                         S0208170
            IF (ISW(5) .GE. 2.AND.ISW(12) .EQ. 1) GO TO 1420                 S0208180
            IF (IFLG3 .EQ. 1.AND.DISP .EQ. 2) GO TO 2230                     S0208190
            IF (IFLG3 .EQ. 3) GO TO 2230                                     S0208200
       1420 CONTINUE                                                         S0208210
            IF (NOTAP .EQ. 0) GO TO 1440                                     S0208220
            IF (L9+NOTAP+NXYSEA .LE. IEND) GO TO 1440                        S0208230
            IF (ISW(5) .EQ. 1.OR.ISW(5) .EQ. 3) GO TO 1430                   S0208240
            IF (ISW(5) .EQ. 2.AND.NSOURC .EQ. 0) GO TO 1430                  S0208250
            GO TO 1180                                                       S0208260
       1430 NOTAP = 0                                                        S0208270
            L9 = 0                                                           S0208280
       1440 CONTINUE                                                         S0208290
      C                                                                      S0208300
      C     START PLUME RISE SECTION FOR STACKS, BRANCH FOR VOLUME AND AREAS. S0208310
      C**********************************************************************S0208320
            IF (ISW(4) .EQ. 0) ZS = 0.0                                      S0208330
            NSW1 = 0                                                         S0208340
            NSW2 = 0                                                         S0208350
            DXP = DX                                                         S0208360
      DYP = DY                                                          S0208370
      IF (TYPE .GT. 0) GO TO 1720                                       S0208380
C     CALCULATE CONSTANTS AND PARAMETERS FOR STACKS                     S0208390
      R = 0.5*D                                                         S0208400
      RO = 0                                                            S0208410
      XO = 0                                                            S0208420
      SIGZOP = 0.0                                                      S0208430
      DO 1450  I=1,NSTBLE                                               S0208440
 1450 XY(I) = 0.0                                                       S0208450
C     DETERMINE IF WAKE EFFECTS USED, JTYPE = 0 NO WAKE EFFECTS,        S0208460
C     JTYPE = 1 SQUAT BUILDING, JTYPE = 2 TALL BUILDING                 S0208470
      JTYPE = 0                                                         S0208480
      IF (HB .LE. 0.0) GO TO 1480                                       S0208490
      HW = 2.0*SQRT(BW*BW*.31830988)                                    S0208500
      C1 = 2.5*HB                                                       S0208510
      C2 = HW*1.5+HB                                                    S0208520
      HMIN = AMIN1(C1,C2)                                               S0208530
      IF (HW .GE. HB) GO TO 1460                                        S0208540
      JTYPE = 2                                                         S0208550
      GO TO 1470                                                        S0208560
 1460 JTYPE = 1                                                         S0208570
 1470 CONTINUE                                                          S0208580
      HB2 = 2.0*HB                                                      S0208590
      HB12 = 1.2*HB                                                     S0208600
C     PLUME RISE EQUATION PARTS                                         S0208610
 1480 C1 = VEL*R*R                                                      S0208620
      C2 = C1*VEL                                                       S0208630
      C1 = C1*G                                                         S0208640
      FC1 = VEL*(R+R)                                                   S0208641
      FC2 = .0727*FC1**1.3333333                                        S0208642
      FC1 = .0141*FC1**1.6666667                                        S0208643
      HP = H                                                            S0208650
      IF (HP .LT. ZRMIN) HP = ZRMIN                                     S0208660
      C3 = HP*ZRI                                                       S0208670
      C13 = 6.0*VEL*R                                                   S0208680
      VELI = 1.0/VEL                                                    S0208690
      C4 = 8.0*R*VELI                                                   S0208700
C     CALC PARAMETERS FOR PLUME RISE                                    S0208710
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      NSW1 = 0                                                          S0208720
      NSW2 = 0                                                          S0208730
      VEL2D = 2.0*D*VEL                                                 S0208740
      D3 = 3.0*D                                                        S0208750
      DO 1610 I =1,NSTBLE                                               S0208760
      DO 1610 J=1,NSPEED                                                S0208770
C     UBAR AT H                                                         S0208780
      UBH = UBAR(J)*C3**P(J,I)                                          S0208790
      UBHI(J,I) = 1.0/UBH                                               S0208800
      HBRIG(J,I) = H                                                    S0208810
      IF (ISW(10) .EQ. 1.AND.VEL .LT. 1.5*UBH) HBRIG(J,I) = H+VEL2D*UBHIS0208820
     1(J,I)-D3                                                          S0208830
C     MAX PLUME RISE FOR STABLE CONDITIONS                              S0208840
      DLHSMX(J,I) = C13*UBHI(J,I)                                       S0208850
      BETAJI = 1.0/(.33333333+UBH*VELI)**2                              S0208860
      C5 = 3.0*BETAJI*UBHI(J,I)                                         S0208870
      C6 = C5*UBHI(J,I)                                                 S0208880
      C7 = A1*UBHI(J,I)**3                                              S0208890
      C8 = C4*(VEL+3.0*UBH)**2*UBHI(J,I)                                S0208900
      C9 = G*DPDZ(J,I)                                                  S0208910
      C10 = 3.1415926*UBH                                               S0208920
      C12 = A2*UBHI(J,I)                                                S0208930
      DO 1610 K=1,NSEASN                                                S0208940
      T = TS                                                            S0208950
      IF (T .LE. 0.0) T = ABS(T)+TA(I,K)                                S0208960
      C11 = TA(I,K)/T                                                   S0208970
C     BUOYANCY TERM                                                     S0208980
      F = C1*(1.0-C11)                                                  S0208990
C     MOMENTUM TERM                                                     S0209000
      FM = C2*C11                                                       S0209010
C     CRITICAL BUOYANCY FLUX                                            S0209011
      FC = FC1                                                          S0209012
      IF (F .LE. 55.0) FC = FC2                                         S0209013
      IF (F .LE. FC) F = 0.0                                            S0209014
      M = 4*(K-1)                                                       S0209020
      IF (C9 .GT. 0) GO TO 1530                                         S0209030
C     UNSTABLE CONDITIONS                                               S0209040
      DELH(J,I,M+1) = FM*C6                                             S0209050
      IF (F .LE. 0.0) GO TO 1510                                        S0209060
      DELH(J,I,M+2) = F*C7                                              S0209070
      IF (F .LE. 55.0) GO TO 1490                                       S0209080
      DELH(J,I,M+3) = 34.0*F**0.4                                       S0209090
      GO TO 1500                                                        S0209100
 1490 DELH(J,I,M+3) = 14.0*F**0.625                                     S0209110
 1500 DELH(J,I,M+3) = DELH(J,I,M+3)*3.5                                 S0209120
      GO TO 1520                                                        S0209130
 1510 DELH(J,I,M+2) = 0.0                                               S0209140
      DELH(J,I,M+3) = C8                                                S0209150
 1520 DELH(J,I,M+4) = 1.0                                               S0209160
      GO TO 1560                                                        S0209170
C     STABLE CONDITIONS                                                 S0209180
 1530 S = C9/TA(I,K)                                                    S0209190
      SSQ = SQRT(S)                                                     S0209200
      SSQI = 1.0/SSQ                                                    S0209210
      DELH(J,I,M+1) = C5*FM*SSQI                                        S0209220
      IF (F .LE. 0.0) GO TO 1540                                        S0209230
      DELH(J,I,M+2) = C12*F/S                                           S0209240
      DELH(J,I,M+3) = C10*SSQI                                          S0209250
      GO TO 1550                                                        S0209260
 1540 DELH(J,I,M+2) = 0.0                                               S0209270
      DELH(J,I,M+3) = 0.5*C10*SSQI                                      S0209280
 1550 DELH(J,I,M+4) = SSQ*UBHI(J,I)                                     S0209290
 1560 CONTINUE                                                          S0209300
      IF (JTYPE .EQ. 0) GO TO 1600                                      S0209310
C     CALC. PLUME RISE DUE TO MOMENTUM FOR WAKE EFFECTS CALCULATIONS    S0209320
      XB = HB2                                                          S0209330
      IF (XB .GE. DELH(J,I,M+3)) XB = DELH(J,I,M+3)                     S0209340
      IF (C9 .GT. 0.0) GO TO 1570                                       S0209350
      HP = XB*DELH(J,I,M+1)                                             S0209360
      GO TO 1580                                                        S0209370
 1570 HP = DELH(J,I,M+1)*SIN(XB*DELH(J,I,M+4))                          S0209380
 1580 HP = HP**.3333333                                                 S0209390
      IF (DPDZ(J,I) .GT. 0.0.AND.HP .GT. DLHSMX(J,I)) HP = DLHSMX(J,I)  S0209400
      HP = HP+HBRIG(J,I)                                                S0209410
      IF (HP .GT. HMIN) GO TO 1590                                      S0209420
      NSW1 = 1                                                          S0209430
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C     SET FLAG TO MODIFY SIGZ                                           S0209440
      DELH(J,I,M+3) = -DELH(J,I,M+3)                                    S0209450
      IF (HP .GT. HB12) GO TO 1600                                      S0209460
C     SET FLAG TO MODIFY XY                                             S0209470
      DELH(J,I,M+4) = -DELH(J,I,M+4)                                    S0209480
      GO TO 1600                                                        S0209490
 1590 NSW2 = 1                                                          S0209500
 1600 CONTINUE                                                          S0209510
 1610 CONTINUE                                                          S0209520
      IF (NSW1 .EQ. 0) JTYPE = 0                                        S0209530
      IF (NSW1 .EQ. 1.AND.NSW2 .EQ. 0) NSW2 = -1                        S0209540
      XMX = 0.0                                                         S0209550
      IF (JTYPE .EQ. 0) GO TO 1770                                      S0209560
C     WAKE EFFECTS COEFFICIENTS TO CALC SIGZ AND XY                     S0209570
C     FOR DISTANCES LESS THAN 10HB (SQUAT) OR 10HW (TALL)               S0209580
      HWOHB = HW/HB                                                     S0209590
      C6 = HW                                                           S0209600
      IF (JTYPE .EQ. 1) C6 = HB                                         S0209610
      XMX = 3.0*C6                                                      S0209620
C     COEFFICIENTS FOR SIGZ ( SIGZ = B1+B2*X )                          S0209630
      B1 = 0.499*C6                                                     S0209640
      B2 = 0.067                                                        S0209650
C     COEFFICIENTS FOR XY ( XY = 2.15*SIGYO/COT(.5*DELTA THETA) )       S0209660
C        (WHERE  SIGYO = B3+B4*X )                                      S0209670
      B4 = 0.067                                                        S0209680
      IF (JTYPE .EQ. 2) GO TO 1650                                      S0209690
      IF (HWOHB .GT. 5) GO TO 1620                                      S0209700
      B3 = 0.35*HW-0.201*HB                                             S0209710
      GO TO 1660                                                        S0209720
 1620 IF (WAKE .EQ. 1) GO TO 1640                                       S0209730
C     SET FLAG TO PRINT MESSAGE THAT UPPER BOUND EQUATIONS USED         S0209740
      IPR4 = 1                                                          S0209750
 1630 CONTINUE                                                          S0209760
      B3 = 0.49*HB                                                      S0209770
      GO TO 1660                                                        S0209780
 1640 B3 = 1.549*HB                                                     S0209790
      GO TO 1660                                                        S0209800
 1650 B3 = 0.149*HW                                                     S0209810
```

```
      1660 CONTINUE                                                     S0209820
C      FOR DISTANCES GREATER THAN OR EQUAL TO 10HB (SQUAT) OR 10HW (TALL)S0209830
           SIGZOP = 1.2*C6                                              S0209840
           C7 = 10.0*C6                                                 S0209850
           DO 1710 I=1,NSTBLE                                           S0209860
C          XZ IS DEPENDENT ON DISTANCE AND IS CALCULATED BELOW IN MAIN MODEL S0209870
C          CALCULATIONS                                                 S0209880
C          CALC XY                                                      S0209890
           IF (JTYPE .EQ. 2) GO TO 1690                                 S0209900
           IF (HWOHB .GT. 5.0) GO TO 1670                               S0209910
           C5 = 0.35*HW+0.5*HB                                          S0209920
           GO TO 1700                                                   S0209930
      1670 IF (WAKE .EQ. 1) GO TO 1680                                  S0209940
           C5 = 0.85*HB                                                 S0209950
           GO TO 1700                                                   S0209960
      1680 C5 = 2.25*HB                                                 S0209970
           GO TO 1700                                                   S0209980
      1690 C5 = 0.85*HW                                                 S0209990
      1700 CONTINUE                                                     S0210000
           XY(I)=VIRTY(C5*2.15,ISTBLE(I))-C7                            S0210010
           IF (XY(I) .LT. 0.0) XY(I) = 0.0                              S0210020
      1710 CONTINUE                                                     S0210030
           HB10 = C7                                                    S0210040
           GO TO 1770                                                   S0210050
C          VOLUME OR AREA EMISSIONS                                     S0210060
C***********************************************************************S0210070
C          CALCULATE CONSTANTS AND PARAMETERS FOR VOLUME AND AREA SOURCES.  S0210080
C          CALCULATE INVERSE UBAR AT H                                  S0210090
      1720 CONTINUE                                                     S0210100
           HP = H                                                       S0210110
           IF (HP .LT. ZRMIN) HP = ZRMIN                                S0210120
           C3 = HP*ZRI                                                  S0210130
           DO 1730 I=1,NSTBLE                                           S0210140
           DO 1730 J=1,NSPEED                                           S0210150
      1730 UBHI(J,I) = 1.0/(UBAR(J)*C3**P(J,I))                         S0210160
C          CALC EFFECTIVE AREA                                          S0210170
           XO = BW*BW                                                   S0210180
C          CALC EFFECTIVE RADIUS                                        S0210190
```

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      RO = SQRT(X0*.31830988)                                           S0210200
      IF (TYPE .EQ. 2) GO TO 1750                                       S0210210
C     VOLUME SOURCES (VIRTUAL DISTANCES)                                S0210220
      XMX = 100.0+2.15*SIGYO                                            S0210230
      SIGZOP = SIGZO                                                    S0210240
C     XZ = VIRTZ(SIGZOP,ISTBLE(I),XB) , XB = DISTANCE                   S0210250
      DO 1740 I=1,NSTBLE                                                S0210260
      XY(I) = VIRTY(SIGYO,ISTBLE(I))                                    S0210270
 1740 CONTINUE                                                          S0210280
      GO TO 1770                                                        S0210290
C     AREA SOURCES (VIRTUAL DISTANCES)                                  S0210300
 1750 C9 = RO*TNHI                                                      S0210310
      DXP = DXP+0.5*BW                                                  S0210320
      DYP = DYP+0.5*BW                                                  S0210330
      XMX = 100.0+0.5*BW                                                S0210340
C     XZ = BW, WIDTH OF AREA SOURCE                                     S0210350
      DO 1760 I=1,NSTBLE                                                S0210360
      XY(I) = C9                                                        S0210370
 1760 CONTINUE                                                          S0210380
C                                                                       S0210390
C     ALL SOURCE TYPES MERGE HERE                                       S0210400
C***********************************************************************S0210410
 1770 C1 = 100.0                                                        S0210420
C     MINIMUM CALCULATION DISTANCE                                      S0210430
      XMX = AMAX1(XMX,C1)                                               S0210440
      IDP = 0                                                           S0210450
      IF (NVS .GT. 0.OR.ISW(1) .EQ. 2) IDP = 1                          S0210460
      C1 = PP1                                                          S0210470
      IF (TYPE .EQ. 2) C1 = C1*X0                                       S0210480
      IF (NVS .GT. 0.AND.ISW(1) .LE. 1) C1 = 0.5*C1                     S0210490
      IF (IPR4 .EQ. 0) GO TO 1780                                       S0210500
      JJ = 3                                                            S0210510
      IF (ISW(6) .GE. 2) JJ = 1                                         S0210520
      CALL TITLR(3,JJ,0)                                                S0210530
      WRITE (JUNT,9030) NUMS                                            S0210540
 1780 CONTINUE                                                          S0210550
      IF (ISW(4) .EQ. 0) ZS = 0.0                                       S0210560
C                                                                       S0210570
```

```
C     LOOP OVER Y GRID COORDINATES                                      S0210580
C***********************************************************************S0210590
      IF (NYPNTS .LE. 0) GO TO 1850                                     S0210600
      IKSW = 1                                                          S0210610
      JJ = 0                                                            S0210620
 1790 JJ = JJ+1                                                         S0210630
      IF (JJ .GT. NYPNTS) GO TO 1850                                    S0210640
      JJJ = (JJ-1)*NXPNTS                                               S0210650
      IF (ISW(2) .GT. 1) GO TO 1800                                     S0210660
      YP = Y(JJ)-DYP                                                    S0210670
      GO TO 1810                                                        S0210680
 1800 YC = Y(JJ)*RADIAN                                                 S0210690
      YS = SIN(YC)                                                      S0210700
      YC = COS(YC)                                                      S0210710
 1810 CONTINUE                                                          S0210720
C                                                                       S0210730
C     LOOP OVER X GRID COORDINATES                                      S0210740
C***********************************************************************S0210750
      II = 0                                                            S0210760
 1820 II = II+1                                                         S0210770
      IF (II .GT. NXPNTS) GO TO 1790                                    S0210780
      IF (ISW(2) .GT. 1) GO TO 1830                                     S0210790
      XP = X(II)-DXP                                                    S0210800
      GO TO 1840                                                        S0210810
 1830 YP = X(II)*YC-DYP                                                 S0210820
      XP = X(II)*YS-DXP                                                 S0210830
 1840 IJ = JJJ+II                                                       S0210840
      GO TO 1900                                                        S0210850
C                                                                       S0210860
C     LOOP OVER SPECIAL CALCULATION POINTS (RECEPTORS)                  S0210870
C***********************************************************************S0210880
 1850 IKSW = 2                                                          S0210890
      IF (NXWYPT .LE. 0) GO TO 2230                                     S0210900
      IJ = NXXYY                                                        S0210910
 1860 IJ = IJ+1                                                         S0210920
      IF (IJ .GT. NXXYYP) GO TO 2230                                    S0210930
      JJ = IJ+NYPSS                                                     S0210940
      II = IJ+NXPSS                                                     S0210950
      IF (ISW(12) .NE. 1) GO TO 1880                                    S0210960
      IF (X(II)) 1880,1870,1880                                         S0210970
 1870 IF (Y(JJ)) 1880,1860,1880                                         S0210980
 1880 CONTINUE                                                          S0210990
      IF (ISW(3) .GT. 1) GO TO 1890                                     S0211000
      YP = Y(JJ)-DYP                                                    S0211010
      XP = X(II)-DXP                                                    S0211020
      GO TO 1900                                                        S0211030
 1890 YC = Y(JJ)*RADIAN                                                 S0211040
      YS = SIN(YC)                                                      S0211050
      YC = COS(YC)                                                      S0211060
      YP = X(II)*YC-DYP                                                 S0211070
      XP = X(II)*YS-DXP                                                 S0211080
 1900 CONTINUE                                                          S0211090
      DO 1910 K=1,NSEASN                                                S0211100
      L1 = (K+L91)*NXXYYP+L9                                            S0211110
 1910 CON(L1+IJ) = 0.0                                                  S0211120
      ZP = 0.0                                                          S0211130
      IF (ISW(4) .NE. 0) ZP = Z(IJ)                                     S0211140
      IF (ZP .LT. ZS) ZP = ZS                                           S0211150
      IF (TYPE .EQ. 2.OR.ZP .LE. H+ZS) GO TO 1920                       S0211160
      WRITE (JUNT,9026) XP,NUMS                                         S0211170
      GO TO 2490                                                        S0211180
 1920 CONTINUE                                                          S0211190
      ZSMZP = ZS-ZP                                                     S0211200
C     SEE IF SOURCE AND POINT ARE TOO CLOSE                             S0211210
      RD = SQRT(XP*XP+YP*YP)                                            S0211220
      IF (RD .GT. XMX) GO TO 1930                                       S0211230
      N = 3                                                             S0211240
      IF (ISW(6) .GE. 2) N = 1                                          S0211250
      CALL TITLR(1,N,0)                                                 S0211260
      WRITE (JUNT,9025) NUMS,X(II),Y(JJ)                                S0211270
      GO TO 2220                                                        S0211280
 1930 CONTINUE                                                          S0211290
C                                                                       S0211300
C     LOOP OVER WIND DIRECTION SECTORS (CATEGORIES)                     S0211310
C***********************************************************************S0211320
      DO 2210 N=1,NSCTOR                                                S0211330
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C     CALC DOWNWIND AND CROSSWIND DISTANCES FROM SOURCE TO RECEPTOR    S0211340
      XB = -XP*PHS(N)-YP*PHC(N)                                         S0211350
      YB = XP*PHC(N)-YP*PHS(N)                                          S0211360
C     IF POINT UPWIND OF SOURCE NO CALC                                 S0211370
      IF (XB .LE. 0.0) GO TO 2210                                       S0211380
      IF (TYPE .EQ. 1) GO TO 1950                                       S0211390
      IF (TYPE .EQ. 2) GO TO 1940                                       S0211400
C     STACK EMISSIONS                                                   S0211410
      IF (JTYPE .EQ. 0) GO TO 1940                                      S0211420
C     PRECALC WAKE EFFECTS IF XB < HB10                                 S0211430
      IF (XB .GE. HB10) GO TO 1950                                      S0211440
      SIGZ1 = B1+XB*B2                                                  S0211450
      XYP1 = XYPU*(B3+XB*B4)                                            S0211460
      SIGIP1 = 1.0/SIGZ1                                                S0211470
      SIGZI1 = -0.5*SIGIP1*SIGIP1                                       S0211480
      GO TO 1950                                                        S0211490
C     AREA SOURCES AND STACKS WITHOUT WAKE EFFECTS                      S0211500
 1940 C2 = C1                                                           S0211510
      XYP = XY(1)                                                       S0211520
C     CALC DIST AND SMOOTHING TERM FOR AREA SOURCES AND STACKS WITH     S0211530
C     NO WAKE EFFECTS                                                   S0211540
      CALL DISTR                                                        S0211550
      IF (ARG .LT. 0.0) GO TO 2210                                      S0211560
      C3 = C2*ARG                                                       S0211570
      IF (ISW(1) .EQ. 2) C3 = C3*RPI                                    S0211580
 1950 CONTINUE                                                          S0211590
C                                                                       S0211600
C     BEGIN LOOP OVER STABILITY FOR MAIN MODEL CALCULATIONS             S0211610
C***********************************************************************S0211620
      DO 2200 I=1,NSTBLE                                                S0211630
      KK = 4*(I-1)                                                      S0211640
      IF (TYPE .NE. 1) GO TO 1960                                       S0211650
      XYP = XY(I)                                                       S0211660
C     CALC DIST AND SMOOTHING TERM FOR VOLUME SOURCES                   S0211670
      CALL DISTR                                                        S0211680
      IF (ARG .LT. 0.0) GO TO 2200                                      S0211690
      C3 = C1*ARG                                                       S0211700
      IF (ISW(1) .EQ. 2) C3 = C3*RPI                                    S0211710
```

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  1960 CONTINUE                                                         S0211720
C     CALC SIGZ FOR VOLUME, AREA AND STACKS WITHOUT WAKE EFFECTS        S0211730
      IF (TYPE .NE. 0.OR.JFLG .EQ. 0.OR.XB .GE. HB10) GO TO 1970        S0211740
      XZ = 0.0                                                          S0211750
      GO TO 1990                                                        S0211760
  1970 CONTINUE                                                         S0211770
      IF (NSW2 .LT. 0) GO TO 2000                                       S0211780
      XZ = 0.0                                                          S0211790
      IF (TYPE .EQ. 0) GO TO 1990                                       S0211800
      IF (TYPE .EQ. 2) GO TO 1980                                       S0211810
      XZ = VIRTZ(SIGZOP,ISTBLE(I),XB,0.0)                               S0211820
      GO TO 1990                                                        S0211830
  1980 XZ = BW                                                          S0211840
  1990 CONTINUE                                                         S0211850
      SIGZ = SIGMAZ(XB+XZ,ISTBLE(I))                                    S0211860
      SIGZIP = 1.0/SIGZ                                                 S0211870
      SIGZI = -0.5*SIGZIP*SIGZIP                                        S0211880
      IF (TYPE .GT. 0.OR.JTYPE .EQ. 0) GO TO 2010                       S0211890
      SIGZ2 = SIGZ                                                      S0211900
      SIGIP2 = SIGZIP                                                   S0211910
      SIGZI2 = SIGZI                                                    S0211920
  2000 IF (XB .LT. HB10) GO TO 2010                                     S0211930
C     WAKE EFFECTS MODIFICATIONS FOR DIST. GREATER THAN OR EQUAL TO 10HBS0211940
      XZ = VIRTZ(SIGZOP,ISTBLE(I),XB,HB10)                              S0211950
      SIGZ1 = SIGMAZ(XB+XZ,ISTBLE(I))                                   S0211960
      XYP1 = XY(I)                                                      S0211970
      SIGIP1 = 1.0/SIGZ1                                                S0211980
      SIGZI1 = -0.5*SIGIP1*SIGIP1                                       S0211990
  2010 CONTINUE                                                         S0212000
      IF (ISW(1) .EQ. 2) BBAR = FUNCT(XB,ISTBLE(I))                     S0212010
C                                                                       S0212020
C     BEGIN LOOP OVER SEASONS FOR MAIN MODEL CALCULATIONS               S0212030
C***********************************************************************S0212040
      DO 2190 K=1,NSEASN                                                S0212050
      M = 4*(K-1)                                                       S0212060
      KN = KK+K                                                         S0212070
      L1 = (K+L91)*NXXYYP+L9                                            S0212080
C                                                                       S0212090
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      C     BEGIN LOOP OVER WIND SPEED FOR MAIN MODEL CALCULATIONS           S0212100
      C***********************************************************************S0212110
            DO 2180 J=1,NSPEED                                               S0212120
            C4 = 0.0                                                         S0212130
            IF (FREQ(J,N,KN) .LE. 0.0) GO TO 2180                            S0212140
            HP = H                                                           S0212150
            IF (TYPE .GT. 0) GO TO 2090                                      S0212160
            IF (JTYPE .EQ. 0) GO TO 2060                                     S0212170
      C     STACK EMISSIONS WITH WAKE EFFECTS                                S0212180
            IF (DELH(J,I,M+3) .GE. 0.0) GO TO 2040                           S0212190
      C     USE MODIFIED SIGZ                                                S0212200
            IF (XB .GE. HB10) GO TO 2020                                     S0212210
            IF (SIGZ1 .GE. SIGZ2) GO TO 2020                                 S0212220
            SIGZ = SIGZ2                                                     S0212230
            SIGZIP = SIGIP2                                                  S0212240
            SIGZI = SIGZI2                                                   S0212250
            GO TO 2030                                                       S0212260
       2020 CONTINUE                                                         S0212270
            SIGZ = SIGZ1                                                     S0212280
            SIGZIP = SIGIP1                                                  S0212290
            SIGZI = SIGZI1                                                   S0212300
       2030 XYP = 0.0                                                        S0212310
            IF (DELH(J,I,M+4) .GE. 0.0) GO TO 2050                           S0212320
      C     USE MODIFIED XY                                                  S0212330
            XYP = XYP1                                                       S0212340
            GO TO 2050                                                       S0212350
      C     UNMODIFIED SIGZ AND XY                                           S0212360
       2040 SIGZ = SIGZ2                                                     S0212370
            XYP = 0.0                                                        S0212380
            SIGZIP = SIGIP2                                                  S0212390
            SIGZI = SIGZI2                                                   S0212400
       2050 CONTINUE                                                         S0212410
      C     CALC DIST AND SMOOTHING TERM FOR STACKS WITH WAKE EFFECTS        S0212420
            CALL DISTR                                                       S0212430
            IF (ARG .LE. 0.0) GO TO 2180                                     S0212440
            C3 = C1*ARG                                                      S0212450
            IF (ISW(1) .EQ. 2) C3 = C3*RPI                                   S0212460
      C     CALCULATE PLUME RISE                                             S0212470
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 2060 C7 = XB                                                           S0212480
      IF (ISW(19) .EQ. 0.OR.C7 .GE. ABS(DELH(J,I,M+3))) C7 = ABS(DELH(J,S0212490
     1I,M+3))                                                           S0212500
      IF (DPDZ(J,I) .GT. 0.0) GO TO 2070                                S0212510
C     UNSTABLE CONDITIONS                                               S0212520
      HP = C7*(DELH(J,I,M+1)+C7*DELH(J,I,M+2))                          S0212530
      GO TO 2080                                                        S0212540
C     STABLE CONDITIONS                                                 S0212550
 2070 HP = C7*ABS(DELH(J,I,M+4))                                        S0212560
      HP = DELH(J,I,M+1)*SIN(HP)+DELH(J,I,M+2)*(1.0-COS(HP))            S0212570
 2080 HP = HP**.33333333                                                S0212580
      IF (DPDZ(J,I) .GT. 0.0.AND.HP .GT. DLHSMX(J,I)) HP = DLHSMX(J,I)  S0212590
      HP = HP+HBRIG(J,I)                                                S0212600
 2090 CONTINUE                                                          S0212610
C     ADJUST PLUME FOR ELEVATION                                        S0212620
      HP = HP+ZSMZP                                                     S0212630
C     IF PLUME OUT OF MIXING LAYER NO CALC.                             S0212640
      IF (HP .GT. HM(J,I,K)) GO TO 2180                                 S0212650
      HMP = HM(J,I,K)                                                   S0212660
      C4 = C3*Q(J,I,K)*FREQ(J,N,KN)*SIGZIP                              S0212670
      IF (ISW(1) .LE. 1) C4 = C4*UBHI(J,I)                              S0212680
C     DEPLETION DUE TO TIME DEPENDENT DECAY                             S0212690
      IF (DECAY .LE. 0.0) GO TO 2100                                    S0212700
      C7 = RP                                                           S0212710
      IF (TYPE .EQ. 2) C7 = RP-RO                                       S0212720
      C4 = C4*EXP(-DECAY*C7*UBHI(J,I))                                  S0212730
 2100 CONTINUE                                                          S0212740
C     CALC VERTICAL TERM                                                S0212750
      IF (ISW(1) .EQ. 2) GO TO 2140                                     S0212760
      IF (NVS .GT. 0) GO TO 2110                                        S0212770
C     CONCENTRATION ONLY                                                S0212780
      CALL VERTC1                                                       S0212790
      GO TO 2160                                                        S0212800
 2110 CONTINUE                                                          S0212810
      C7 = RP*UBHI(J,I)                                                 S0212820
      VV = 0.0                                                          S0212830
      DO 2120 IL=1,NVS                                                  S0212840
      VSROU = C7*VS(IL)                                                 S0212850
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C     CONCENTRATION WITH DEPLETION DUE TO GRAVITATIONAL DEPOSITION      S0212860
      CALL VERTC2(GAMMA(IL))                                            S0212870
      VV = VV+V*FRQ(IL)                                                 S0212880
 2120 CONTINUE                                                          S0212890
 2130 V = VV                                                            S0212900
      GO TO 2160                                                        S0212910
 2140 CONTINUE                                                          S0212920
      VV = 0.0                                                          S0212930
      C7 = RP*UBHI(J,I)                                                 S0212940
      DO 2150 IL=1,NVS                                                  S0212950
      VSROU = C7*VS(IL)                                                 S0212960
C     GRAVITATIONAL DEPOSITION                                          S0212970
      CALL VERTC3(GAMMA(IL))                                            S0212980
      VV = VV+(1.0-GAMMA(IL))*FRQ(IL)*V                                 S0212990
 2150 CONTINUE                                                          S0213000
      GO TO 2130                                                        S0213010
 2160 CONTINUE                                                          S0213020
      C4 = C4*V                                                         S0213030
C                                                                       S0213040
C     ACCUMULATE CONCENTRATION OR DEPOSITION                            S0213050
      CON(L1+IJ) = CON(L1+IJ)+C4                                        S0213060
C                                                                       S0213070
C     END LOOP OVER WIND SPEED                                          S0213080
 2170 CONTINUE                                                          S0213090
 2180 CONTINUE                                                          S0213100
C***********************************************************************S0213110
C                                                                       S0213120
C     END LOOP OVER SEASONS                                             S0213130
 2190 CONTINUE                                                          S0213140
C***********************************************************************S0213150
C                                                                       S0213160
C     END LOOP OVER STABILITY                                           S0213170
 2200 CONTINUE                                                          S0213180
C***********************************************************************S0213190
C                                                                       S0213200
C     END LOOP OVER WIND DIRECTION SECTORS                              S0213210
 2210 CONTINUE                                                          S0213220
C***********************************************************************S0213230
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C                                                                       S0213240
C     END LOOP OVER X,Y AXIS POINTS AND SPECIAL RECEPTOR POINTS         S0213250
 2220 CONTINUE                                                          S0213260
      GO TO (1820,1860),IKSW                                            S0213270
C***********************************************************************S0213280
 2230 CONTINUE                                                          S0213290
C                                                                       S0213300
C     START SECTION TO OUTPUT INDIVIDUAL SOURCES AND ACCUMULATE FOR THE S0213310
C     TOTAL SUM OF SOURCES.                                             S0213320
C                                                                       S0213330
C     IS TAPE OUTPUT DESIRED                                            S0213340
 2240 IF (ISW(5) .EQ. 0.OR.ISW(5) .EQ. 2) GO TO 2260                    S0213350
C     OUTPUT SOURCE RECORD                                              S0213360
      WRITE (NUNT) (NSOR(I),I=1,NSO)                                    S0213370
      NT = NT+1                                                         S0213380
      ITSAVE(NT) = NUMS*10+TYPE                                         S0213390
      IF (NT .GE. NTT) CALL OUTPT(-4,NT,X,Y,Z,NTT)                      S0213400
C     OUTPUT CONCENTRATION (DEPOSITION) RECORD(S)                       S0213410
      DO 2250 K=1,NSEASN                                                S0213420
      L1 = (K+L91)*NXXYYP+L9                                            S0213430
      WRITE (NUNT) (CON(L1+I),I=1,NXXYYP)                               S0213440
 2250 CONTINUE                                                          S0213450
 2260 CONTINUE                                                          S0213460
C     IF SOURCE PART OF THIS COMBINED SOURCE GROUP USE IT               S0213470
      IF (NOCOMB(NG) .EQ. 0) GO TO 2270                                 S0213480
      CALL CHECKR(0,J)                                                  S0213490
      IF (J .NE. 0) GO TO 2270                                          S0213500
C     J = 0 IS NOT PART OF COMBINED, = 1 YES PART OF COMBINED           S0213510
      GO TO 2380                                                        S0213520
 2270 CONTINUE                                                          S0213530
C                                                                       S0213540
C     ACCUMULATE TOTAL CONCENTRATION (DEPOSITION) OVER SELECTED SOURCES S0213550
C     AND PRINT IF DESIRED                                              S0213560
      NT4 = 1                                                           S0213570
      KK = 1                                                            S0213580
      DO 2320 K=1,NSEASN                                                S0213590
      L1 = (K+L91)*NXXYYP+L9                                            S0213600
      IF (ISW(11) .EQ. 2) GO TO 2290                                    S0213610
      IF (ISW(8) .EQ. 2.OR.ISW(7) .EQ. 2) GO TO 2280                    S0213620
C     PRINT INDIVIDUAL SOURCES - SEASONAL                               S0213630
      CALL OUTPT(KK,K,X,Y,CON(L1+1),1)                                  S0213640
 2280 IF (ISW(8) .EQ. 1.AND.ISW11 .NE. 2) GO TO 2300                    S0213650
C     ACCUMULATE FOR SUM OF SOURCES                                     S0213660
 2290 L2 = (K-1)*NXXYYP                                                 S0213670
      IF (L92 .EQ. 1) L2 = L2+NXXYYP                                    S0213680
      CALL SUMMER(CON(L2+1),CON(L1+1),K+1)                              S0213690
      IF (ISW(11) .EQ. 2) GO TO 2320                                    S0213700
 2300 CONTINUE                                                          S0213710
      IF (ISW(8) .EQ. 2.OR.ISW(7) .EQ. 1) GO TO 2320                    S0213720
      IF (L92 .EQ. 2) GO TO 2310                                        S0213730
      L2 = 0                                                            S0213740
      IF (L92 .EQ. 0) L2 = (1+L91)*NXXYYP+L9                            S0213750
      IF (L2 .NE. 0.AND.K .EQ. 1) GO TO 2320                            S0213760
      CALL SUMMER(CON(L2+1),CON(L1+1),K)                                S0213770
      GO TO 2320                                                        S0213780
 2310 CALL SUMMER(Z,CON(L1+1),K)                                        S0213790
 2320 CONTINUE                                                          S0213800
      IF (ISW(11) .EQ. 2) GO TO 2360                                    S0213810
      IF (ISW(8) .EQ. 2.OR.ISW(7) .EQ. 1) GO TO 2360                    S0213820
      IF (ISW(1) .EQ. 2) GO TO 2340                                     S0213830
      IF (L92 .EQ. 2) GO TO 2330                                        S0213840
      L2 = 0                                                            S0213850
      IF (L92 .EQ. 0) L2 = (1+L91)*NXXYYP+L9                            S0213860
      CALL SUMMER(CON(L2+1),CON,-1)                                     S0213870
      GO TO 2340                                                        S0213880
 2330 CALL SUMMER(Z,CON,-1)                                             S0213890
 2340 CONTINUE                                                          S0213900
      KK = 2                                                            S0213910
C     PRINT INDIVIDUAL SOURCES - ANNUAL                                 S0213920
      IF (L92 .EQ. 2) GO TO 2350                                        S0213930
      CALL OUTPT(KK,K,X,Y,CON(L2+1),1)                                  S0213940
      GO TO 2360                                                        S0213950
 2350 CALL OUTPT(KK,K,X,Y,Z,1)                                          S0213960
 2360 CONTINUE                                                          S0213970
C     INCREMENT SOURCE SAVE NUMBERS FOR INTERNAL STORAGE OF SOURCES     S0213980
      IF (NOTAP .EQ. 0) GO TO 2400                                      S0213990
 2370 KSO = KSO+1                                                       S0214000
      L9 = KSO*NXYSEA                                                   S0214010
      GO TO 2400                                                        S0214020
 2380 IF (NG .EQ. 1.AND.ISW(12) .GE. 0) GO TO 2390                      S0214030
      J = NOCOMB(NG)                                                    S0214040
      IF (NUMS .GT. IABS(IDSORC(J+NGT))) GO TO 2410                     S0214050
 2390 IF (NOTAP .EQ. 0) GO TO 2400                                      S0214060
      IF (NG .GT. 1.OR.ISW(12) .EQ. -1) GO TO 2370                      S0214070
      CALL CHECKR(NGROUP,J)                                             S0214080
      IF (J .NE. 0) GO TO 2370                                          S0214090
 2400 CONTINUE                                                          S0214100
      GO TO 790                                                         S0214110
C                                                                       S0214120
C     END LOOP OVER SOURCES, RETURN FOR NEXT SOURCE                     S0214130
C***********************************************************************S0214140
C                                                                       S0214150
C     BEGIN OUTPUT FOR COMBINED SOURCES                                 S0214160
 2410 IF (ISW(8) .EQ. 1.AND.ISW(11) .NE. 2) GO TO 2480                  S0214170
      NT4 = 1                                                           S0214180
      KK = 1                                                            S0214190
      DO 2440 K=1,NSEASN                                                S0214200
      L1 = (K-1)*NXXYYP                                                 S0214210
      IF (L92 .EQ. 1) L1 = L1+NXXYYP                                    S0214220
      IF (ISW(7) .EQ. 2) GO TO 2420                                     S0214230
C     PRINT SUM OF SOURCES - SEASONAL                                   S0214240
      CALL OUTPT(KK,K,X,Y,CON(L1+1),2)                                  S0214250
 2420 IF (ISW(7) .LE. 1) GO TO 2440                                     S0214260
      IF (L92 .EQ. 2) GO TO 2430                                        S0214270
      CALL SUMMER(CON,CON(L1+1),K)                                      S0214280
      GO TO 2440                                                        S0214290
 2430 CALL SUMMER(Z,CON(L1+1),K)                                        S0214300
 2440 CONTINUE                                                          S0214310
      IF (ISW(7) .LE. 1) GO TO 2480                                     S0214320
      IF (ISW(1) .EQ. 2) GO TO 2460                                     S0214330
      IF (L92 .EQ. 2) GO TO 2450                                        S0214340
      CALL SUMMER(CON,CON,-1)                                           S0214350
      GO TO 2460                                                        S0214360
 2450 CALL SUMMER(Z,CON,-1)                                             S0214370
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  2460 CONTINUE                                                         S0214380
      KK = 2                                                            S0214390
C     PRINT SUM OF SOURCES - ANNUAL                                     S0214400
      IF (L92 .EQ. 2) GO TO 2470                                        S0214410
      CALL OUTPT(KK,K,X,Y,CON,2)                                        S0214420
      GO TO 2480                                                        S0214430
  2470 CALL OUTPT(KK,K,X,Y,Z,2)                                         S0214440
  2480 CONTINUE                                                         S0214450
C                                                                       S0214460
C     END OF COMBINED SOURCES, IF ISW(11) = 2 GO DO SECOND PASS FOR     S0214470
C     DISPLAY OF MAXIMA. OTHERWISE GO TO NEXT GROUP OF COMBINED SOURCES S0214480
      ISW(6) = 0                                                        S0214490
      IF (ISW(11) .EQ. 2) GO TO 710                                     S0214500
      GO TO 700                                                         S0214510
C                                                                       S0214520
C     END OF COMBINED SOURCES LOOP                                      S0214530
C     ******************************************************************S0214540
C                                                                       S0214550
C     ERRORS COME TO HERE                                               S0214560
  2490 IF (ISW(5) .LE. 0.OR.ISW(5) .EQ. 2) GO TO 2500                   S0214570
      IF (IFLG2 .NE. 0) GO TO 2500                                      S0214580
      IF (NG .GT. 1.OR.ISW(12) .EQ. -1) GO TO 2500                      S0214590
C     WRITE END OF TAPE RECORD                                          S0214600
      NSOR(1) = 999999                                                  S0214610
      WRITE (NUNT) (NSOR(I),I=1,NSO)                                    S0214620
      IF (ISW(15) .LT. 0) GO TO 2500                                    S0214630
      ENDFILE NUNT                                                      S0214640
      ENDFILE NUNT                                                      S0214650
C                                                                       S0214660
C     END OF PROG. CLOSE ACTIVE FILES                                   S0214670
C     ******************************************************************S0214680
  2500 IF (NT .GT. 0) CALL OUTPT(-4,NT,X,Y,Z,NTT)                       S0214690
      WRITE (JUNT,9024) K1                                              S0214700
      IF (JUNT .EQ. 6.OR.INDFL .EQ. 1) GO TO 2510                       S0214710
      ENDFILE JUNT                                                      S0214720
      ENDFILE JUNT                                                      S0214730
  2510 CONTINUE                                                         S0214740
      STOP                                                              S0214750
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9001 FORMAT (20A4)                                                      S0214760
9002 FORMAT (8F10.0)                                                    S0214770
9003 FORMAT (/54H **** ERROR - NUMBER OF SETTLING VELOCITIES FOR SOURCESS0214780
    1,I7,49H IS ZERO, MUST INPUT FOR GRAVITATIONAL DEPOSITION)          S0214790
9004 FORMAT (10X,19HNUMBER OF SOURCES =,I4/                             S0214800
    210X,37HNUMBER OF X AXIS GRID SYSTEM POINTS =,I5/                   S0214810
    310X,37HNUMBER OF Y AXIS GRID SYSTEM POINTS =,I5/                   S0214820
    410X,26HNUMBER OF SPECIAL POINTS =,I5/                              S0214830
    510X,19HNUMBER OF SEASONS =,I4/                                     S0214840
    610X,30HNUMBER OF WIND SPEED CLASSES =,I4/                          S0214850
    710X,29HNUMBER OF STABILITY CLASSES =,I4/                           S0214860
    810X,34HNUMBER OF WIND DIRECTION CLASSES =,I4/                      S0214870
    910X,43HFILE NUMBER OF DATA FILE USED FOR REPORTS =,I4)             S0214871
9005 FORMAT (10X,22HTHE PROGRAM IS RUN IN ,3A4)                         S0214880
9006 FORMAT (72H *** WARNING - FREQ. OF OCCURRENCE OF SPD VS. DIR IS NOS0214890
    1T 1.0 FOR SEASON ,I2,19H, PROG. DIVIDES BY ,F9.5,13H TO NORMALIZE)S0214900
9007 FORMAT (10X,52HCONCENTRATION (DEPOSITION) UNITS CONVERSION FACTOR S0214910
    1=,E14.8/                                                           S0214920
    210X,41HACCELERATION OF GRAVITY (METERS/SEC**2) =,F7.3/             S0214930
    310X,46HHEIGHT OF MEASUREMENT OF WIND SPEED (METERS) =,F8.3/        S0214940
    410X,47HENTRAINMENT PARAMETER FOR UNSTABLE CONDITIONS =,F6.3/       S0214950
    510X,45HENTRAINMENT PARAMETER FOR STABLE CONDITIONS =,F6.3/         S0214960
    610X,72HCORRECTION ANGLE FOR GRID SYSTEM VERSUS DIRECTION DATA NORTS0214970
    7H (DEGREES) =,F8.3/                                                S0214980
    810X,19HDECAY COEFFICIENT =,E14.8)                                  S0214990
9008 FORMAT (10X,25HPROGRAM OPTION SWITCHES =,20(I2,1H,))               S0215000
9009 FORMAT (2X,3A4,A3,1X,A1,6A4,2H (,A4,A3,2H)=,6(F11.2,1H,)/(10X,10(FS0215010
    111.2,1H,)))                                                        S0215020
9010 FORMAT (1H0,27X,46H  - AMBIENT AIR TEMPERATURE (DEGREES KELVIN) -/S0215030
    1/20X,6(11HSTABILITY  )/20X,6(8HCATEGORY,I2,1X))                    S0215040
9011 FORMAT (10X,6HSEASON,I3,6F11.4)                                    S0215050
9012 FORMAT (1H0,36X,32H- MIXING LAYER HEIGHT (METERS) -/)              S0215060
9013 FORMAT (50X,6HSEASON,I2/21X,6(12H  WIND SPEED)/21X,6(10H  CATEGORYS0215070
    1,I2))                                                              S0215080
9014 FORMAT (1X,18HSTABILITY CATEGORY,I2,6E12.6)                        S0215090
9015 FORMAT (1H0,20X,66H- FREQUENCY OF OCCURRENCE OF WIND SPEED, DIRECTS0215100
    1ION AND STABILITY -)                                               S0215110
9016 FORMAT (1H0,47X,6HSEASON,I2)                                       S0215120
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 9017 FORMAT (1H0,41X,18HSTABILITY CATEGORY,I2//20X,6(12H  WIND SPEED)/2S0215130
     10X,6(10H  CATEGORY,I2)/8X,13HDIRECTION    ,6(1H(,F7.4,4HMPS))/7X,0S0215140
     29H(DEGREES))                                                     S0215150
 9018 FORMAT (10X,F7.3,3X,6(F12.8))                                     S0215160
 9019 FORMAT (1H0,24X,66H- VERTICAL POTENTIAL TEMPERATURE GRADIENT (DEGRS0215170
     1EES KELVIN/METER) -/)                                            S0215180
 9020 FORMAT (21X,6(12H  WIND SPEED)/21X,6(10H  CATEGORY,I2))          S0215190
 9021 FORMAT (1X,18HSTABILITY CATEGORY,I2,6E12.6)                       S0215200
 9022 FORMAT (1H0,39X,36H- WIND PROFILE POWER LAW EXPONENTS -/)         S0215210
 9023 FORMAT (I5,3I1,2F10.0,7F7.0,I1,I2)                                S0215220
 9024 FORMAT (1H1/////1X,41(1H*),22H END OF ISCLT PROGRAM,,I6,19H SOURCES0215230
     1S PROCESSED ,40(1H*))                                            S0215240
 9025 FORMAT (35H WARNING - DISTANCE BETWEEN SOURCE ,I6,15H AND POINT X,S0215250
     1Y=,F11.2,1H,,F11.2,23H IS LESS THAN PERMITTED)                   S0215260
 9026 FORMAT (/25H **** ERROR - ELEVATION (,F8.2,47H) EXCEEDS SOURCE EMIS0215270
     1SSION ELEVATION FOR SOURCE ,I5,18H, PROG. TERMINATED)            S0215280
 9027 FORMAT (/81H **** ERROR - DISP CANNOT EQUAL 2 WHEN QFLG IS GREATERS0215290
     1 THAN 0. OFFENDING SOURCE =,I5,18H, PROG. TERMINATED)            S0215300
 9028 FORMAT (/45H **** ERROR - DISP GREATER THAN 0 FOR SOURCE ,I5,40H, S0215310
     1NO MORE TAPE SOURCES, PROG. TERMINATED)                          S0215320
 9029 FORMAT (/45H **** ERROR - DISP GREATER THAN 0 FOR SOURCE ,I5,56H, S0215330
     1CANNOT FIND CORRESPONDING TAPE SOURCE, PROG TERMINATED)          S0215340
 9030 FORMAT (32H0WARNING - HW/HB > 5 FOR SOURCE ,I5,89H PROG. USES LATES0215350
     1RAL VIRTUAL DIST. FOR UPPER BOUND OF CONCENTRATION (DEPOSITION). IS0215360
     2F LOWER/60H BOUND IS DESIRED SET WAKE EFFECTS FLAG (WAKE) = 1 AND S0215370
     3RERUN)                                                           S0215380
 9031 FORMAT (10X,40HSOURCES USED TO FORM SOURCE COMBINATION ,I2,6H ARE S0215390
     1-,10(I6,1H,))                                                    S0215400
 9032 FORMAT (10X,17(I6,1H,))                                           S0215410
 9033 FORMAT (10X,48HALL SOURCES ARE USED TO FORM SOURCE COMBINATION ,I2S0215420
     1)                                                                S0215430
 9034 FORMAT (30H0*** ERROR - AVAILABLE CORE = ,I6,19H, PROBLEM REQUIRESS0215440
     1 ,I6,18H OR MORE LOCATIONS/)                                     S0215450
 9035 FORMAT (71H0*** ERROR - MAX NO. OF SOURCES EXCEEDED FOR NGROUP OR S0215460
     1ISW(11)=2 OPTION/)                                               S0215470
 9036 FORMAT (48H *** WARNING - EXIT VELOCITY IS <= 0 FOR SOURCE ,I5,35HS0215480
     1 PROG. SETS TO 1.0E-5 AND CONTINUES)                             S0215490
 9037 FORMAT (44H *** ERROR - STACK DIAMETER <= 0 FOR SOURCE ,I5)       S0215500
 9038 FORMAT (35H *** ERROR - SIGYO <= 0 FOR SOURCE ,I5)                S0215510
 9039 FORMAT (35H *** ERROR - SIGZO <= 0 FOR SOURCE ,I5)                S0215520
 9040 FORMAT (32H *** ERROR - X0 <= 0 FOR SOURCE ,I5)                   S0215530
 9041 FORMAT (20H *** ERROR - SOURCE ,I5,32H LESS IN VALUE THAN LAST SOUS0215540
     1RCE ,I5,6H READ.)                                                 S0215550
 9042 FORMAT (34H *** ERROR - DISP CODE FOR SOURCE ,I5,17H IS OUT OF RANS0215560
     1GE.)                                                              S0215570
 9043 FORMAT (34H *** ERROR - TYPE CODE FOR SOURCE ,I5,17H IS OUT OF RANS0215580
     1GE.)                                                              S0215590
 9044 FORMAT (34H *** ERROR - QFLG CODE FOR SOURCE ,I5,17H IS OUT OF RANS0215600
     1GE.)                                                              S0215610
      END                                                               S0215620
      SUBROUTINE OUTPT(KK,K,X,Y,Z,JSS)                                  S0300010
C     THIS SUBROUTINE PRINTS THE INPUT SOURCE DATA AND ALL CONCENTRATIONS0300020
C     (DEPOSITION) CALCULATIONS                                         S0300030
      COMMON /DIM/ NSOURC,NXPNTS,NYPNTS,NXWYPT,NSEASN,NSPEED,NSTBLE,    S0300040
     1NSCTOR,ISW(20),UNITS(20),TITLE(20),NOFILE                         S0300050
      COMMON /REST/ IUNT,JUNT,NXXYY,NXXYYP,ISTBLE(6),IFLG3,LINE,NLINES, S0300060
     1ICARD,NXPSS,NYPSS,MUNT,NUNT,ICONT(3,2),ITSAVE(572),NT1,NT2,NT3,NT4S0300070
     2,MSG7(4,3),MSG8(2),MSG9(2,2),MSG10(4,3),NGROUP,NOCOMB(20),IDSORC(2S0300080
     300),IEND,XSEA,ISAVSO(300),NG,NGT,NXWY                             S0300090
      COMMON /SORC/ NUMS,TYPE,DX,DY,H,ZS,TS,VEL,D,HB,BW,BL,NVS,VS(20),  S0300100
     1FRQ(20),GAMMA(20),Q(6,6,4),QFLG,WAKE                              S0300110
      COMMON /HEAD/ MSG3(4),MSG4(8),IS,N3,I3,M3,ILN                     S0300120
      DIMENSION X(1),Y(1),Z(1),MSG1(6),MSG2(6),IXS(11),IYS(11),ZMX(10)  S0300130
     1,MSG5(4),MSG6(10),IX10(50),IY10(50)                               S0300140
      EQUIVALENCE (SIGY0,TS),(SIGZ0,VEL),(BW,X0)                        S0300150
      INTEGER TITLE,UNITS,TYPE,QFLG,WAKE                                S0300160
      DATA IX10,IY10/100*0/                                             S0300170
      DATA MSG1/4H STA,2HCK,4HVOLU,2HME,4H ARE,1HA/                     S0300180
      DATA IBLNK,IX/1H ,1HX/                                            S0300190
      DATA IAST/1H*/                                                    S0300200
      DATA MSG2/4HSTAB,4HILIT,1HY,1H ,4HSPEE,1HD/                       S0300210
      DATA MSG3/4HSEAS,4HONAL,4H  AN,4HNUAL/                            S0300220
      DATA MSG4/4HCONC,4HENTR,4HATIO,1HN,4H DEP,4HOSIT,3HION,1H /       S0300230
      DATA MSG5/4HPER ,4HSQUA,4HRE M,4HETER/                            S0300240
      DATA MSG10/4HDIST,4HANCE,2*1H ,4HRANG,4HE   ,2*1H ,4HAZIM,4HUTH , S0300250
     14HBEAR,3HING/                                                     S0300260
      IF (KK .EQ. -4) GO TO 880                                         S0300270
      IS = JSS                                                          S0300280
      IF (KK .NE. 4) GO TO 240                                          S0300290
C     PRINT SOURCE DATA                                                 S0300300
C***********************************************************************S0300310
      ILN = 0                                                           S0300320
      NUM = 1                                                           S0300330
      IF (TYPE .EQ. 2) GO TO 20                                         S0300340
      IF (TYPE .EQ. 1) GO TO 10                                         S0300350
      NUM = 3                                                           S0300360
      GO TO 20                                                          S0300370
   10 NUM = 2                                                           S0300380
   20 CONTINUE                                                          S0300390
      M1 = 0                                                            S0300400
      IF (ISW(16) .NE. 0) GO TO 60                                      S0300410
      IF (ISW(11) .NE. 2.AND.ISW(8) .NE. 2) GO TO 60                    S0300420
      IF (NVS .EQ. 0) GO TO 30                                          S0300430
      ZMX(1) = FLOAT(NVS)/7.0                                           S0300440
      M1 = ZMX(1)                                                       S0300450
      IF (ZMX(1) .GT. FLOAT(M1)) M1 = M1+1                              S0300460
      M1 = 3*M1+2                                                       S0300470
   30 IF (QFLG .GT. 0) GO TO 40                                         S0300480
      M1 = M1+3                                                         S0300490
      GO TO 60                                                          S0300500
   40 IF (QFLG .EQ. 3) GO TO 50                                         S0300510
      J = NSTBLE                                                        S0300520
      IF (QFLG .EQ. 2) J = NSPEED                                       S0300530
      M1 = M1+2+J                                                       S0300540
      GO TO 60                                                          S0300550
   50 M1 = M1+NSEASN*(3+NSPEED)+1                                       S0300560
   60 CONTINUE                                                          S0300570
      DO 70 I=1,10                                                      S0300580
   70 MSG6(I) = UNITS(10+I)                                             S0300590
      IF (TYPE .NE. 2) GO TO 90                                         S0300600
      J = 0                                                             S0300610
      DO 80 I=1,10                                                      S0300620
      IF (MSG6(I) .NE. IBLNK) GO TO 80                                  S0300630
      J = J+1                                                           S0300640
      IF (J .GT. 4) GO TO 90                                            S0300650
      MSG6(I) = MSG5(J)                                                 S0300660
   80 CONTINUE                                                          S0300670
   90 CONTINUE                                                          S0300680
      I1 = IBLNK                                                        S0300690
      I2 = IBLNK                                                        S0300700
      IF (ICARD .NE. 0) GO TO 100                                       S0300710
      I2 = IX                                                           S0300720
      GO TO 110                                                         S0300730
  100 I1 = IX                                                           S0300740
  110 HLN = 1                                                           S0300750
C                                                                       S0300760
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      IF (LSTILN .EQ. ILN) NLN = 0                                      S0300770
      CALL TITLR(NUM+M1,1,NLN)                                          S0300780
      LINE = LINE-M1                                                    S0300790
  120 I3 = 2*TYPE+1                                                     S0300800
      IF (TYPE .EQ. 1) GO TO 130                                        S0300810
      IF (TYPE .EQ. 2) GO TO 140                                        S0300820
C     OUTPUT STACK INFORMATION                                          S0300830
      WRITE (JUNT,9002) I1,I2,NUMS,MSG1(I3),MSG1(I3+1),DX,DY,H,ZS,TS,VELS0300840
     1,D,HB,BW,WAKE                                                     S0300850
      GO TO 150                                                         S0300860
  130 WRITE (JUNT,9003) I1,I2,NUMS,MSG1(I3),MSG1(I3+1),DX,DY,H,ZS,SIGYO,S0300870
     1SIGZO                                                             S0300880
      GO TO 150                                                         S0300890
  140 WRITE (JUNT,9004) I1,I2,NUMS,MSG1(I3),MSG1(I3+1),DX,DY,H,ZS,X0    S0300900
  150 CONTINUE                                                          S0300910
C     OUTPUT PARTICULATE INFORMATION IF PRESENT                         S0300920
      IF (NVS .LE. 0) GO TO 170                                         S0300930
      CALL TITLR(1,1,0)                                                 S0300940
      WRITE (JUNT,9018)                                                 S0300950
      II = -6                                                           S0300960
  160 II = II+7                                                         S0300970
      IF (II .GT. NVS) GO TO 170                                        S0300980
      JJ = II+6                                                         S0300990
      IF (JJ .GT. NVS) JJ = NVS                                         S0301000
      CALL TITLR(4,1,0)                                                 S0301010
      WRITE (JUNT,9019) (I,I=II,JJ)                                     S0301020
      WRITE (JUNT,9020) (VS(I),I=II,JJ)                                 S0301030
      WRITE (JUNT,9021) (FRQ(I),I=II,JJ)                                S0301040
      WRITE (JUNT,9022) (GAMMA(I),I=II,JJ)                              S0301050
      GO TO 160                                                         S0301060
  170 CONTINUE                                                          S0301070
C     OUTPUT SOURCE STRENGTHS                                           S0301080
      IF (QFLG .EQ. 3) GO TO 210                                        S0301090
      IF (QFLG .NE. 0) GO TO 180                                        S0301100
C     VARIES BY SEASON ONLY                                             S0301110
      CALL TITLR(3,1,0)                                                 S0301120
      WRITE (JUNT,9008) MSG6                                            S0301130
      WRITE (JUNT,9005) (L,L=1,4),(Q(1,1,L),L=1,NSEASN)                 S0301140
      GO TO 230                                                         S0301150
  180 J = NSPEED                                                        S0301160
      IF (QFLG .EQ. 1) J = NSTBLE                                       S0301170
      I1 = 3*QFLG-2                                                     S0301180
      I2 = 1                                                            S0301190
      I3 = L                                                            S0301200
      IF (QFLG .EQ. 1) GO TO 190                                        S0301210
      I2 = L                                                            S0301220
      I3 = 1                                                            S0301230
  190 CALL TITLR(2,1,0)                                                 S0301240
      WRITE (JUNT,9008) MSG6                                            S0301250
      WRITE (JUNT,9006) MSG2(I1),MSG2(I1+1),MSG2(I1+2),(I,I=1,NSEASN)   S0301260
      DO 200 L=1,J                                                      S0301270
      CALL TITLR(1,1,0)                                                 S0301280
      WRITE (JUNT,9007) L,(Q(I2,I3,I),I=1,NSEASN)                       S0301290
  200 CONTINUE                                                          S0301300
      GO TO 230                                                         S0301310
  210 CALL TITLR(1,1,0)                                                 S0301320
      WRITE (JUNT,9008) MSG6                                            S0301330
      DO 220 L=1,NSEASN                                                 S0301340
      CALL TITLR(3,1,0)                                                 S0301350
      WRITE (JUNT,9009) L,(I,I=1,NSTBLE)                                S0301360
      DO 220 J=1,NSPEED                                                 S0301370
      CALL TITLR(1,1,0)                                                 S0301380
      WRITE (JUNT,9010) J,(Q(J,I,L),I=1,NSTBLE)                         S0301390
  220 CONTINUE                                                          S0301400
  230 CONTINUE                                                          S0301410
      GO TO 870                                                         S0301420
C                                                                       S0301430
C     PRINT CALCULATIONS ON GRID SYSTEM                                 S0301440
C***********************************************************************S0301450
  240 N3 = 1                                                            S0301460
      IF (KK .EQ. 2) N3 = 3                                             S0301470
      IF (KK .NE. 3.AND.ISW(10) .EQ. 1) GO TO 440                       S0301480
      M3 = 0                                                            S0301490
      IF (ISW(1) .EQ. 2) M3 = 4                                         S0301500
      M1 = 1                                                            S0301510
      IF (ISW(2) .EQ. 2) M1 = 2                                         S0301520
      M2 = 1                                                            S0301530
      IF (ISW(2) .EQ. 2) M2 = 3                                         S0301540
      M4 = 1                                                            S0301550
      IF (ISW(2) .EQ. 2) M4 = 2                                         S0301560
      IF (IS .EQ. 2) GO TO 260                                          S0301570
      IF (NG. LE. 1.OR.KK .EQ. 3) GO TO 260                             S0301580
      IF (NOCOMB(NG-1) .EQ. 0) GO TO 250                                S0301590
      CALL CHECKR(NG-1,I1)                                              S0301600
      IF (I1 .EQ. 0) GO TO 260                                          S0301610
  250 CONTINUE                                                          S0301620
      IF (NOCOMB(NG) .EQ. 1) GO TO 260                                  S0301621
      IF (ISW(11) .EQ. 1) GO TO 870                                     S0301630
      IF (ISW(12) .EQ. 1) GO TO 870                                     S0301640
      GO TO 440                                                         S0301650
  260 CONTINUE                                                          S0301660
      IF (NXPNTS .EQ. 0) GO TO 360                                      S0301670
      ILN = 1                                                           S0301680
      NN = 2                                                            S0301690
      IF (ISW(16).EQ.0.OR.KK.EQ.3.OR.LINE+10.GT.NLINES) NN = 1          S0301700
C                                                                       S0301710
      LSTILN = ILN                                                      S0301720
      LX = 1                                                            S0301730
      I2 = 0                                                            S0301740
  270 I1 = I2+1                                                         S0301750
      IF (I1 .GT. NXPNTS) GO TO 360                                     S0301760
      I2 = I1+8                                                         S0301770
      IF (I2 .GT. NXPNTS) I2 = NXPNTS                                   S0301780
      J4 = 1                                                            S0301790
      J3 = NYPNTS+1                                                     S0301800
  280 J3 = J3-1                                                         S0301810
      IF (J3 .EQ. 0) GO TO 270                                          S0301820
      IF (J4 .NE. 0) GO TO 340                                          S0301830
      CALL TITLR(1,3,0)                                                 S0301840
      IF (LINE .GT. 3) GO TO 330                                        S0301850
  290 WRITE (JUNT,9001)                                                 S0301860
      LINE = LINE+1                                                     S0301870
      CALL HEADNG(KK,K)                                                 S0301880
  300 CONTINUE                                                          S0301890
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      WRITE (JUNT,9011) (MSG10(I,M1),I=1,2),(X(I),I=I1,I2)              S0301900
      IF (KK .EQ. 3) GO TO 310                                          S0301910
      WRITE (JUNT,9012) (MSG10(I,M2),I=1,4),(MSG9(I,M4),I=1,2),(MSG4(I+MS0301920
     13),I=1,4)                                                         S0301930
      GO TO 320                                                         S0301940
  310 WRITE (JUNT,9013) (MSG10(I,M2),I=1,4),(MSG9(I,M4),I=1,2)          S0301950
  320 LINE = LINE+6                                                     S0301960
  330 J4 = (J3-1)*NXPNTS                                                S0301970
      WRITE (JUNT,9014) Y(J3),(Z(J4+I),I=I1,I2)                         S0301980
      J4 = 0                                                            S0301990
      LX = 0                                                            S0302000
      GO TO 280                                                         S0302010
  340 IF (LX .EQ. 0) GO TO 350                                          S0302020
      CALL TITLR(1,3,NN)                                                S0302030
      GO TO 290                                                         S0302040
  350 CALL TITLR(8,3,0)                                                 S0302050
      LINE = LINE-7                                                     S0302060
      IF (LINE .LE. 3) GO TO 290                                        S0302070
      WRITE (JUNT,9001)                                                 S0302080
      WRITE (JUNT,9001)                                                 S0302090
      LINE = LINE+2                                                     S0302100
      GO TO 300                                                         S0302110
C                                                                       S0302120
C     PRINT CALCULATIONS AT SPECIAL DISCRETE POINTS                     S0302130
C***********************************************************************S0302140
  360 CONTINUE                                                          S0302150
      IF (KK .NE. 3.AND.ISW(12) .EQ. 1) GO TO 440                       S0302160
      IF (NXWYPT .LE. 0) GO TO 440                                      S0302170
      ILN = 2                                                           S0302180
      J3 = NXXYY                                                        S0302190
      LX = 1                                                            S0302200
      NN = 2                                                            S0302210
      IF (LSTILN .EQ. 1) GO TO 370                                      S0302220
      IF (ISW(16) .EQ. 0.OR.KK .EQ. 3) NN = 1                           S0302230
  370 CONTINUE                                                          S0302240
      I2 = 0                                                            S0302250
  380 I1 = I2+1                                                         S0302260
      IF (I1 .GT. NXWYPT) GO TO 430                                     S0302270
      I2 = I1+2                                                         S0302280
      IF (I2 .GT. NXWYPT) I2 = NXWYPT                                   S0302290
      IF (LX .EQ. 0) GO TO 410                                          S0302300
      CALL TITLR(9,3,NN)                                                S0302310
      LINE = LINE-8                                                     S0302320
  390 CONTINUE                                                          S0302330
      LINE = LINE-1                                                     S0302340
  400 CONTINUE                                                          S0302350
      WRITE (JUNT,9001)                                                 S0302360
      LINE = LINE+2                                                     S0302370
      CALL HEADNG(KK,K)                                                 S0302380
      LSTILN = 1                                                        S0302390
      GO TO 420                                                         S0302400
  410 CONTINUE                                                          S0302410
      CALL TITLR(1,3,0)                                                 S0302420
      IF (LINE .LE. 3) GO TO 390                                        S0302430
  420 WRITE (JUNT,9015) (X(NXPNTS+J),Y(NYPNTS+J),Z(J3+J),J=I1,I2)       S0302440
      LX = 0                                                            S0302450
      GO TO 380                                                         S0302460
  430 LSTILN = 2                                                        S0302470
  440 CONTINUE                                                          S0302490
      IF (ISW(10) .EQ. 0.OR.KK.EQ. 3) GO TO 970                         S0302500
C                                                                       S0302510
C     FIND MAX TEN VALUES OF CONCENTRATION (DEPOSITION)                 S0302520
C***********************************************************************S0302530
      IF (ISW(11) .NE. 2) GO TO 470                                     S0302540
C     DETERMINE AND SAVE INDICES OF THE MAX 10 POINTS FOR THE COMBINED  S0302550
C     SOURCES FOR SEASON 1, 2, --- , ANNUAL                             S0302560
      IF (IS .EQ. 1) GO TO 870                                          S0302570
      L = (K-1)*10                                                      S0302580
      IF (KK .EQ. 2) L = NSEASN*10                                      S0302590
  450 CALL MXIMUM(IXS,IYS,ZMX,Z)                                        S0302600
      DO 460 I=1,10                                                     S0302610
      IX10(L+I) = IXS(I)                                                S0302620
  460 IY10(L+I) = IYS(I)                                                S0302630
      GO TO 870                                                         S0302640
  470 CONTINUE                                                          S0302650
      L6 = 0                                                            S0302660
      L = 0                                                             S0302670
      L4 = 0                                                            S0302680
      IF (NXWYPT .EQ. 0) GO TO 490                                      S0302690
      IF (NXPNTS .EQ. 0) GO TO 500                                      S0302700
C     HAVE BOTH TYPES OF RECEPTORS                                      S0302710
      IF (ISW(2) .EQ. ISW(3)) GO TO 490                                 S0302720
      IF (NXXYY .GT. NXWYPT) GO TO 480                                  S0302730
C     USE ISW(3) AS PRIMARY UNITS DISPLAY                               S0302740
      L = ISW(3)                                                        S0302750
      L4 = 2                                                            S0302760
      GO TO 510                                                         S0302770
C     USE ISW(2) AS PRIMARY UNITS DISPLAY                               S0302780
  480 L = ISW(2)                                                        S0302790
      L4 = 1                                                            S0302800
      GO TO 510                                                         S0302810
  490 L = ISW(2)                                                        S0302820
      L4 = 0                                                            S0302830
      GO TO 510                                                         S0302840
  500 L = ISW(3)                                                        S0302850
      L4 = 0                                                            S0302860
  510 CONTINUE                                                          S0302870
      M1 = 1                                                            S0302880
      M2 = 3                                                            S0302890
      M4 = 4                                                            S0302900
      M5 = 2                                                            S0302910
      M6 = 3                                                            S0302920
      M7 = 4                                                            S0302930
      M8 = 2                                                            S0302940
      IF (L .LT. 2) GO TO 520                                           S0302950
      M1 = 2                                                            S0302960
      M2 = 1                                                            S0302970
      M4 = 2                                                            S0302980
      M5 = 3                                                            S0302990
      M6 = 1                                                            S0303000
      M7 = 2                                                            S0303010
      M8 = 3                                                            S0303020
  520 CONTINUE                                                          S0303030
      IF (ISW(11) .NE. 1) GO TO 540                                     S0303040
      CALL MXIMUM(IXS,IYS,ZMX,Z)                                        S0303050
      L2 = 0                                                            S0303060
      DO 530 I=1,10                                                     S0303070
      IF (IXS(I) .EQ. 0.OR.IYS(I) .EQ. 0) GO TO 530                     S0303080
      IF (ZMX(I) .GT. 0.0) L2 = I                                       S0303090
  530 CONTINUE                                                          S0303100
      GO TO 620                                                         S0303110
  540 IF (ISW(12) .EQ. -1) GO TO 570                                    S0303120
      IF (ISW(12) .NE. 1) GO TO 870                                     S0303130
C     MAXIMUM POINTS HAVE BEEN INPUT BY THE USER                        S0303140
      L = 0                                                             S0303150
      IF (NSEASN .EQ. 1.OR.NXWYPT .LE. 10) GO TO 550                    S0303160
      L = (K-1)*10                                                      S0303170
      IF (KK .EQ. 2) L = NSEASN*10                                      S0303180
  550 L2 = 0                                                            S0303190
      DO 560 I=1,10                                                     S0303200
      IXS(I) = NXPNTS+I+L                                               S0303210
      IYS(I) = NYPNTS+I+L                                               S0303220
      ZMX(I) = Z(NXXYY+I+L)                                             S0303230
      IF (IXS(I) .EQ. 0.OR.IYS(I) .EQ. 0) GO TO 560                     S0303240
      IF (ZMX(I) .GT. 0.0) L2 = I                                       S0303250
  560 CONTINUE                                                          S0303260
      GO TO 620                                                         S0303270
  570 CONTINUE                                                          S0303280
      L = (K-1)*10                                                      S0303290
      IF (KK .EQ. 2) L = NSEASN*10                                      S0303300
  580 L2 = 0                                                            S0303310
      DO 610 I=1,10                                                     S0303320
      IXS(I) = IX10(I+L)                                                S0303330
      IYS(I) = IY10(I+L)                                                S0303340
      IF (IXS(I) .GT. NXPNTS) GO TO 590                                 S0303350
      JJ = (IYS(I)-1)*NXPNTS+IXS(I)                                     S0303360
      GO TO 600                                                         S0303370
  590 JJ = NXXYY+IXS(I)-NXPNTS                                          S0303380
  600 ZMX(I) = Z(JJ)                                                    S0303390
      IF (IXS(I) .EQ. 0.OR.IYS(I) .EQ. 0) GO TO 610                     S0303400
      IF (ZMX(I) .GT. 0.0) L2 = I                                       S0303410
  610 CONTINUE                                                          S0303420
  620 CONTINUE                                                          S0303430
      I = 1                                                             S0303440
      IF (ISW(12).EQ.0.OR.IS.EQ.2.OR.NOCOMB(NG).EQ.0) GO TO 640         S0303450
      J = 2                                                             S0303460
  630 I = I+1                                                           S0303470
      J = J+1                                                           S0303480
      IF (J .GT. NOCOMB(NG)) GO TO 640                                  S0303490
      J = J+12                                                          S0303500
      GO TO 630                                                         S0303510
  640 L1 = I-1                                                          S0303520
      NN = 2                                                            S0303520
      IF (LSTILN .EQ. 1.OR.LSTILN .EQ. 2) GO TO 660                     S0303530
      IF (ISW(16) .EQ. 0) NN = 1                                        S0303540
  660 CONTINUE                                                          S0303590
      ILN = 3                                                           S0303600
      L2 = L2+1                                                         S0303610
      IF (L2 .LE. 1) GO TO 860                                          S0303620
      L5 = IBLNK                                                        S0303630
      L3 = 0                                                            S0303640
      DO 850 J=1,L2                                                     S0303650
      IF (J .EQ. L2) GO TO 680                                          S0303660
      I1 = IXS(J)                                                       S0303670
      I2 = IYS(J)                                                       S0303680
      IF (I1 .EQ. 0.OR.I2 .EQ. 0) GO TO 850                             S0303690
      IF (L3 .NE. 0) GO TO 680                                          S0303700
      L3 = 1                                                            S0303710
      L = 11                                                            S0303720
      IF (LSTILN .EQ. 3.AND.NN .EQ. 2) L = L+L2/2                       S0303730
      L = L+L1                                                          S0303740
      CALL TITLR(L,3,NN)                                                S0303750
      LINE = LINE-L                                                     S0303760
      IF (LINE .GT. 2.AND.LSTILN .EQ. 3) GO TO 670                      S0303770
      IF (LINE .GT. 2.AND.LSTILN .NE. 0) GO TO 690                      S0303780
  670 WRITE (6,9030)                                                    S0303790
      LINE = LINE+1                                                     S0303800
      CALL HEADNG(KK,K)                                                 S0303810
      GO TO 690                                                         S0303820
  680 CALL TITLR(1,3,0)                                                 S0303830
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      IF (LINE .LE. 3) GO TO 670                                        S0303840
      GO TO 800                                                         S0303850
  690 IF (ISW(12) .NE. 0) GO TO 710                                     S0303860
  700 WRITE (JUNT,9023)                                                 S0303870
      LINE = LINE+3                                                     S0303880
      GO TO 790                                                         S0303890
  710 IF (ISW(12) .GT. 0) GO TO 740                                     S0303900
      IF (IS .EQ. 2) GO TO 700                                          S0303910
C     INDIVIDUAL SOURCE CONTRIBUTION TO COMBINED MAXIMUM 10             S0303920
      IF (NOCOMB(NG) .EQ. 0) GO TO 730                                  S0303930
      J1 = 1                                                            S0303940
      J2 = 2                                                            S0303950
      IF (J2 .GT. NOCOMB(NG)) J2 = NOCOMB(NG)                           S0303960
      WRITE (JUNT,9024) (IDSORC(NGT+I),I=J1,J2)                         S0303970
      LINE = LINE+2                                                     S0303980
  720 J1 = J2                                                           S0303990
      J1 = J1+1                                                         S0304000
      IF (J1 .GT. NOCOMB(NG)) GO TO 780                                 S0304010
      J2 = J1+11                                                        S0304020
      IF (J2 .GT. NOCOMB(NG)) J2 = NOCOMB(NG)                           S0304030
      LINE = LINE+1                                                     S0304040
      WRITE (JUNT,9025) (IDSORC(NGT+I),I=J1,J2)                         S0304050
      LINE = LINE+1                                                     S0304060
      GO TO 720                                                         S0304070
  730 WRITE (JUNT,9026)                                                 S0304080
      LINE = LINE+3                                                     S0304090
      GO TO 790                                                         S0304100
  740 IF (NG .EQ. 1) GO TO 760                                          S0304110
  750 WRITE (JUNT,9027)                                                 S0304120
      LINE = LINE+3                                                     S0304130
      GO TO 790                                                         S0304140
  760 IF (ISW(8) .EQ. 1) GO TO 750                                      S0304150
      IF (NOCOMB(NG) .EQ. 0) GO TO 770                                  S0304160
      J1 = 1                                                            S0304170
      J2 = 2                                                            S0304180
      IF (J2 .GT. NOCOMB(NG)) J2 = NOCOMB(NG)                           S0304190
      WRITE (JUNT,9028) (IDSORC(NGT+I),I=J1,J2)                         S0304200
      LINE = LINE+2                                                     S0304210
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              GO TO 720                                                 S0304220
          770 WRITE (JUNT,9029)                                         S0304230
              LINE = LINE+3                                             S0304240
              GO TO 790                                                 S0304250
          780 WRITE (JUNT,9030)                                         S0304260
              LINE = LINE+1                                             S0304270
          790 CONTINUE                                                  S0304280
              LINE = LINE+6                                             S0304290
              WRITE (JUNT,9016) (MSG4(M3+I),I=1,4),(MSG10(I,2),I=M2,M4),(MSG10(IS0304300
             1,M5),I=M6,M7),(MSG10(I,M8),I=3,4),(MSG9(I,1),I=1,2),(MSG9(I,M1),I=S0304310
             21,2)                                                      S0304320
          800 IF (J .EQ. L2) GO TO 830                                  S0304330
              L5 = IBLNK                                                S0304340
              IF (L4 .EQ. 0) GO TO 820                                  S0304350
              IF (L4 .EQ. 2) GO TO 810                                  S0304360
        C     LABEL FROM GRID SYSTEM USED, DETERMINE IF THIS RECEPTOR IS AN     S0304370
        C     ARBITRARILY SPACED RECEPTOR WITH DIFFERENT UNITS          S0304380
              IF (I1 .GT. NXPNTS) L5 = IAST                             S0304390
              GO TO 820                                                 S0304400
        C     LABEL FROM ARBITRARILY SPACED POINTS USED, DETERMINE IF THIS      S0304410
        C     RECEPTOR IS FROM GRID SYSTEM WITH DIFFERENT UNITS         S0304420
          810 IF (I1 .LE. NXPNTS) L5 = IAST                             S0304430
          820 CONTINUE                                                  S0304440
              WRITE (JUNT,9017) L5,X(I1),Y(I2),ZMX(J)                   S0304450
              IF (L5 .NE. IBLNK) L6 = 1                                 S0304460
              GO TO 850                                                 S0304470
          830 IF (L4 .EQ. 0) GO TO 850                                  S0304480
              IF (L6 .EQ. 0) GO TO 850                                  S0304490
              IF (L4 .EQ. 2) GO TO 840                                  S0304500
              L6 = 1                                                    S0304510
              IF (ISW(3) .GE. 2) L6 = 2                                 S0304520
              WRITE (JUNT,9031) (MSG9(L4,L6),L4=1,2)                    S0304530
              GO TO 850                                                 S0304540
          840 L6 = 1                                                    S0304550
              IF (ISW(2) .GE. 2) L6 = 2                                 S0304560
              WRITE (JUNT,9031) (MSG9(L4,L6),L4=1,2)                    S0304570
          850 CONTINUE                                                  S0304580
          860 CONTINUE                                                  S0304590
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      IF (ISW(16) .EQ. 0) LINE = NLINES                                 S0304600
  870 CONTINUE                                                          S0304610
      GO TO 920                                                         S0304620
  880 CONTINUE                                                          S0304630
      LINE = NLINES                                                     S0304640
      ILN = 4                                                           S0304650
      I1 = -10                                                          S0304660
  890 I1 = I1+11                                                        S0304670
      IF (I1 .GT. K) GO TO 910                                          S0304680
      I2 = I1+10                                                        S0304690
      IF (I2 .GT. K) I2 = K                                             S0304700
      I = 0                                                             S0304710
      DO 900 J=I1,I2                                                    S0304720
      I = I+1                                                           S0304730
      IXS(I) = ITSAVE(J)/10                                             S0304740
  900 IYS(I) = ITSAVE(J)-IXS(I)*10                                      S0304750
      CALL TITLR(1,4,0)                                                 S0304760
      WRITE (JUNT,9001) (IXS(J),IYS(J),J=1,I)                           S0304770
      GO TO 890                                                         S0304780
  910 K = 0                                                             S0304790
      LINE = NLINES                                                     S0304800
  920 CONTINUE                                                          S0304810
      LSTILN = ILN                                                      S0304820
      RETURN                                                            S0304830
 9001 FORMAT (11(1X,I6,3X,I1,1X))                                       S0304840
 9002 FORMAT (1X,A1,1X,A1,I7,1X,A4,A2,2F12.2,F7.2,F8.2,23H GAS EXIT TEMPS0304850
     1 (DEG K)=,F7.2,24H, GAS EXIT VEL. (M/SEC)=,F6.2,1H,/58X,19HSTACK DS0304860
     2IAMETER (M)=,F6.3,28H, HEIGHT OF ASSO. BLDG. (M)=,F6.2,10H, WIDTH S0304870
     30F/58X,16HASSO. BLDG. (M)=,F7.2,21H, WAKE EFFECTS FLAG =,I2)      S0304880
 9003 FORMAT (1X,A1,1X,A1,I7,1X,A4,A2,2F12.2,F7.2,F8.2,61H STANDARD DEVIS0304890
     1ATION OF THE CROSSWIND SOURCE DISTRIBUTION (M)=,F7.2/58X,59HSTANDAS0304900
     2RD DEVIATION OF THE VERTICAL SOURCE DISTRIBUTION (M)=,F7.2)       S0304910
 9004 FORMAT (1X,A1,1X,A1,I7,1X,A4,A2,2F12.2,F7.2,F8.2,19H WIDTH OF AREAS0304920
     1 (M)=,F8.2)                                                       S0304930
 9005 FORMAT (65X,4(5X,6HSEASON,I2)/67X,4(1PE13.5))                     S0304940
 9006 FORMAT (58X,2A4,A1,9H CATEGORY,4(3X,6HSEASON,I2,2X))              S0304950
 9007 FORMAT (67X,I2,7X,4(1PE13.5))                                     S0304960
 9008 FORMAT (64X,20H- SOURCE STRENGTHS (,10A4,3H) -)                   S0304970
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9009 FORMAT (92X,8H- SEASON,I2,2H -/39X,14HSPEED CATEGORY,31X,24H- STABS0304980
    1ILITY CATEGORIES -/49X,6(10X,1H(,I1,1H)))                         S0304990
9010 FORMAT (46X,I2,5X,6(1PE13.5))                                     S0305000
9011 FORMAT (53X,25H- GRID SYSTEM RECEPTORS -/51X,10H- X AXIS (,2A4,11HS0305010
    1, METERS) -/14X,9F13.3)                                           S0305020
9012 FORMAT (1X,8HY AXIS (,3A4,A3,2H, ,2A4,1H),25X,3H-  ,3A4,A1,3H  -/1S0305030
    14X,29(4H----)/)                                                   S0305040
9013 FORMAT (1X,8HY AXIS (,3A4,A3,2H, ,2A4,1H),24X,14H- ELEVATIONS -/14S0305050
    1X,29(4H----)/)                                                    S0305060
9014 FORMAT (1X,F13.3,1X,9F13.6)                                       S0305070
9015 FORMAT (3(1X,F9.1,F11.1,F14.6,5X))                                S0305080
9016 FORMAT (51X,1HX,12X,1HY,8X,4A4/47X,23HCOORDINATE   COORDINATE/49X,   S0305090
    1A4,A1,8X,A4,A3/62X,A4,A3/48X,1H(,A4,A2,1H),5X,1H(,A4,A3,1H)/47X,39S0305100
    2(1H-))                                                            S0305110
9017 FORMAT (44X,A1,1X,F11.2,2X,F11.2,2X,F14.6)                        S0305120
9018 FORMAT (82X,26H- PARTICULATE CATEGORIES -)                        S0305130
9019 FORMAT (78X,7(5X,I2))                                             S0305140
9020 FORMAT (58X,22HFALL VELOCITY (MPS)   ,7F7.4)                      S0305150
9021 FORMAT (58X,13HMASS FRACTION,9X,7F7.4)                            S0305160
9022 FORMAT (58X,22HREFLECTION COEFFICIENT,7F7.4)                      S0305170
9023 FORMAT (1H0,45X,40H- PROGRAM DETERMINED MAXIMUM 10 VALUES -/)     S0305180
9024 FORMAT (1H0,19X,78H- 10 CONTRIBUTING VALUES TO PROGRAM DETERMINED S0305190
    1MAXIMUM 10 OF COMBINED SOURCES ,2(I6,1H,))                        S0305200
9025 FORMAT (20X,2H- ,12(I6,1H,))                                      S0305210
9026 FORMAT (1H0,23X,83H- 10 CONTRIBUTING VALUES TO PROGRAM DETERMINED S0305220
    1MAXIMUM 10 OF ALL SOURCES COMBINED -/)                            S0305230
9027 FORMAT (1H0,45X,39H- USER SPECIFIED 10 SPECIAL RECEPTORS -/)      S0305240
9028 FORMAT (1H0,16X,84H- 10 CONTRIBUTING VALUES TO USER SPECIFIED 10 SS0305250
    1PECIAL RECEPTORS OF COMBINED SOURCES ,2(I6,1H,))                  S0305260
9029 FORMAT (1H0,20X,89H- 10 CONTRIBUTING VALUES TO USER SPECIFIED 10 SS0305270
    1PECIAL RECEPTORS OF ALL SOURCES COMBINED -/)                      S0305280
9030 FORMAT (1H )                                                      S0305290
9031 FORMAT (23X,47H* - MEANS RECEPTORS ARE IN UNITS OF METERS AND ,A4,S0305300
    1A3,32H, NOT UNITS GIVEN IN THE HEADING)                           S0305310
     END                                                               S0305320
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      SUBROUTINE HEADNG(KK,K)                                           S0400010
C     PRINT HEADINGS ON CONCENTRATION (DEPOSITION) TABLES               S0400020
      COMMON /DIN/ NSOURC,NXPNTS,NYPNTS,NXWYPT,NSEASN,NSPEED,NSTBLE,    S0400030
     1NSCTOR,ISW(20),UNITS(20),TITLE(20),NOFILE                         S0400040
      COMMON /REST/ IUNT,JUNT,NXXYY,NXXYYP,ISTBLE(6),IFLG3,LINE,NLINES, S0400050
     1ICARD,NXPSS,NYPSS,MUNT,NUNT,ICONT(3,2),ITSAVE(572),NT1,NT2,NT3,NT4S0400060
     2,MSG7(4,3),MSG8(2),MSG9(2,2),MSG10(4,3),NGROUP,NOCOMB(20),IDSORC(2S0400070
     300),IEND,XSEA,ISAVSO(300),NG,NGT,NXWY                             S0400080
      COMMON /SORC/ NUMS,TYPE,DX,DY,H,ZS,TS,VOL,D,HB,BW,BL,NVS,VS(20),  S0400090
     1FRQ(20),GAMMA(20),Q(6,6,4),QFLG                                   S0400100
      COMMON /HEAD/ MSG3(4),MSG4(8),IS,N3,I3,M3,ILN                     S0400110
      DATA IBLNK/1H /                                                   S0400120
      IC = ICONT(1,NT4)                                                 S0400130
      IF (NT4 .EQ. 1) IC = IBLNK                                        S0400140
      IF (KK .NE. 3) GO TO 30                                           S0400150
      IF (ILN .NE. 1) GO TO 10                                          S0400160
      WRITE (JUNT,9001) (ICONT(I,NT4),I=1,3)                            S0400170
      LINE = LINE+2                                                     S0400180
      GO TO 200                                                         S0400190
   10 IF (ILN .NE. 2) GO TO 200                                         S0400200
      IF (ILN .NE. 2) GO TO 200                                         S0400210
      M1 = 1                                                            S0400220
      M2 = 1                                                            S0400230
      IF (ISW(3) .LE. 1) GO TO 20                                       S0400240
      M1 = 2                                                            S0400250
      M2 = 3                                                            S0400260
   20 WRITE (JUNT,9007) (ICONT(I,NT4),I=1,3)                            S0400270
      LINE = LINE+3                                                     S0400280
      WRITE (JUNT,9008) ((MSG10(I,M1),I=1,2),(MSG10(I,M2),I=1,2),J=1,3),S0400290
     1((MSG10(I,M2),I=3,4),J=1,3),((MSG9(I,M1),I=1,2),J=1,3)            S0400300
      LINE = LINE+5                                                     S0400310
      GO TO 200                                                         S0400320
   30 IF (ILN .NE. 2) GO TO 40                                          S0400330
      IF (LINE .GT. 4.AND.LSTILN .EQ. 1) GO TO 180                      S0400340
   40 IF (ISW(1) .EQ. 2) GO TO 100                                      S0400350
      IF (IS .EQ. 2) GO TO 60                                           S0400360
      J2 = NUMS                                                         S0400370
   50 WRITE (JUNT,9002) MSG3(N3),MSG3(N3+1),(UNITS(I),I=1,10),J2        S0400380
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      1,IC,ICONT(2,NT4)                                                 S0400390
       LINE = LINE+1                                                    S0400400
       GO TO 160                                                        S0400410
    60 IF (NOCOMB(NG) .GT. 0) GO TO 70                                  S0400420
       WRITE (JUNT,9003) MSG3(N3),MSG3(N3+1),(UNITS(I),I=1,10),IC,      S0400430
      1ICONT(2,NT4)                                                     S0400440
       LINE = LINE+1                                                    S0400450
       GO TO 160                                                        S0400460
    70 J1 = 2                                                           S0400470
       IF (J1 .GT. NOCOMB(NG)) J1 = NOCOMB(NG)                          S0400480
       IF (J1 .GT. 1) GO TO 80                                          S0400490
       IF (IDSORC(J1+NGT) .LT. 0) GO TO 80                              S0400500
       J2 = IDSORC(J1+NGT)                                              S0400510
       GO TO 50                                                         S0400520
    80 WRITE (JUNT,9010) MSG3(N3),MSG3(N3+1),(UNITS(I),I=1,10),IC,ICONT(2S0400530
      1,NT4),(IDSORC(I+NGT),I=1,J1)                                     S0400540
       LINE = LINE+1                                                    S0400550
    90 J1 = J1+1                                                        S0400560
       IF (J1 .GT. NOCOMB(NG)) GO TO 160                                S0400570
       J2 = J1+16                                                       S0400580
       IF (J2 .GT. NOCOMB(NG)) J2 = NOCOMB(NG)                          S0400590
       WRITE (JUNT,9011) (IDSORC(I+NGT),I=J1,J2)                        S0400600
       LINE = LINE+1                                                    S0400610
       J1 = J2                                                          S0400620
       GO TO 90                                                         S0400630
   100 IF (IS .EQ. 2) GO TO 120                                         S0400640
       J2 = NUMS                                                        S0400650
   110 WRITE (JUNT,9004) MSG3(N3),MSG3(N3+1),(UNITS(I),I=1,10),J2       S0400660
      1,IC,ICONT(2,NT4)                                                 S0400670
       LINE = LINE+1                                                    S0400680
       GO TO 160                                                        S0400690
   120 IF (NOCOMB(NG) .GT. 0) GO TO :30                                 S0400700
       WRITE (JUNT,9005) MSG3(N3),MSG3(N3+1),(UNITS(I),I=1,10),IC,      S0400710
      1ICONT(2,NT4)                                                     S0400720
       LINE = LINE+1                                                    S0400730
       GO TO 160                                                        S0400740
   130 J1 = 2                                                           S0400750
       IF (J1 .GT. NOCOMB(NG)) J1 = NOCOMB(NG)                          S0400760
      IF (J1 .GT. 1) GO TO 140                                          S0400770
      IF (IDSORC(J1+NGT) .LT. 0) GO TO 140                              S0400780
      J2 = IDSORC(J1+NGT)                                               S0400790
      GO TO 110                                                         S0400800
  140 WRITE (JUNT,9012) MSG3(N3),MSG3(N3+1),(UNITS(I),I=1,10),IC,ICONT(2S0400810
     1,NT4),(IDSORC(I+NGT),I=1,J1)                                      S0400820
      LINE = LINE+1                                                     S0400830
  150 J1 = J1+1                                                         S0400840
      IF (J1 .GT. NOCOMB(NG)) GO TO 160                                 S0400850
      J2 = J1+16                                                        S0400860
      IF (J2 .GT. NOCOMB(NG)) J2 = NOCOMB(NG)                           S0400870
      WRITE (JUNT,9011) (IDSORC(I+NGT),I=J1,J2)                         S0400880
      LINE = LINE+1                                                     S0400890
      J1 = J2                                                           S0400900
      GO TO 150                                                         S0400910
  160 IF (KK .NE. 1) GO TO 170                                          S0400920
      WRITE (JUNT,9006) K                                               S0400930
      LINE = LINE+1                                                     S0400940
  170 CONTINUE                                                          S0400950
      IF (ILN .NE. 2) GO TO 200                                         S0400960
  180 CONTINUE                                                          S0400970
      M1 = 1                                                            S0400980
      M2 = 1                                                            S0400990
      IF (ISW(3) .LE. 1) GO TO 190                                      S0401000
      M1 = 2                                                            S0401010
      M2 = 3                                                            S0401020
  190 WRITE (JUNT,9009) ((MSG4(J+M3),J=1,4),I=1,3)                      S0401030
      WRITE (JUNT,9008) ((MSG10(I,M1),I=1,2),(MSG10(I,M2),I=1,2),J=1,3),S0401040
     1((MSG10(I,M2),I=3,4),J=1,3),((MSG9(I,M1),I=1,2),J=1,3)            S0401050
      LINE = LINE+8                                                     S0401060
  200 CONTINUE                                                          S0401070
      NT4 = 2                                                           S0401080
      RETURN                                                            S0401090
 9001 FORMAT (34X,51H- GRID SYSTEM RECEPTOR TERRAIN ELEVATIONS (METERS) S0401100
     1,3A4/)                                                            S0401110
 9002 FORMAT (9X,3H** ,2A4,29H GROUND LEVEL CONCENTRATION (,10A4,16H) DUS0401120
     1E TO SOURCE ,I6,1X,2A4,3H **)                                     S0401130
 9003 FORMAT (6X,3H** ,2A4,29H GROUND LEVEL CONCENTRATION (,10A4,28H) FRS0401140
     10M ALL SOURCES COMBINED ,2A4,3H **)                              S0401150
9004 FORMAT (9X,3H** ,2A4,26H GROUND LEVEL DEPOSITION (,10A4,16H) DUE TS0401160
     10 SOURCE ,I6,1X,2A4,3H **)                                       S0401170
9005 FORMAT (8X,3H** ,2A4,26H GROUND LEVEL DEPOSITION (,10A4,28H) FROM S0401180
     1ALL SOURCES COMBINED ,2A4,3H **)                                 S0401190
9006 FORMAT (60X,7HSEASON ,I2)                                         S0401200
9007 FORMAT (42X,48H- DISCRETE RECEPTOR TERRAIN ELEVATIONS (METERS) ,3AS0401210
     14//1X,3(4X,1HX,9X,1HY,7X,9HELEVATION,9X))                        S0401220
9008 FORMAT (1X,3(1X,2A4,1X,2A4,22X)/1X,3(10X,2A4,22X)/1X,3(11H (METERSS0401230
     1) (,A4,A3,1H),21X)/14X,58(2H--)/)                                S0401240
9009 FORMAT (1H0,54X,22H- DISCRETE RECEPTORS -/1X,3(4X,1HX,9X,1HY,6X,3AS0401250
     14,A1,6X))                                                        S0401260
9010 FORMAT (3X,3H** ,2A4,29H GROUND LEVEL CONCENTRATION (,10A4,2H) ,2AS0401270
     14,22HFROM COMBINED SOURCES ,2(I6,1H,))                           S0401280
9011 FORMAT (3X,3H** ,17(I6,1H,))                                      S0401290
9012 FORMAT (3X,3H** ,2A4,26H GROUND LEVEL DEPOSITION (,10A4,2H) ,2A4,2S0401300
     12HFROM COMBINED SOURCES ,2(I6,1H,))                              S0401310
      END                                                              S0401320
      SUBROUTINE TITLR(N,L,LL)                                          S0500010
      COMMON /DIM/ NSOURC,NXPNTS,NYPNTS,NXWYPT,NSEASN,NSPEED,NSTBLE,    S0500020
     1NSCTOR,ISW(20),UNITS(20),TITLE(20)                                S0500030
      COMMON /REST/ IUNT,JUNT,NXXYY,NXXYYP,ISTBLE(6),IFLG3,LINE,NLINES, S0500040
     1ICARD,NXPSS,NYPSS,MUNT,NUNT,ICONT(3,2),ITSAVE(572),NT1,NT2,NT3,NT4S0500050
     2,MSG7(4,3),MSG8(2),MSG9(2,2),MSG10(4,3),NGROUP,NOCOMB(20),IDSORC(2S0500060
     300),IEND,XSEA,ISAVSO(300),NG,NGT,NXWY                             S0500070
      DATA IPAGE/0/                                                     S0500080
      IF (LL .EQ. 1) GO TO 10                                           S0500090
      LINE = LINE+N                                                     S0500100
      IF (LINE .LT. NLINES) GO TO 70                                    S0500110
   10 IPAGE = IPAGE+1                                                   S0500120
      WRITE (JUNT,9001) TITLE,IPAGE                                     S0500130
      LINE = 2                                                          S0500140
   20 GO TO (30,40,50,60),L                                             S0500150
   30 WRITE (JUNT,9002) (ICONT(I,NT2),I=1,3)                            S0500160
      IF (ISW(8) .EQ. 2) NT2 = 2                                        S0500170
      LINE = LINE+8+N                                                   S0500180
      GO TO 80                                                          S0500190
   40 WRITE (JUNT,9003) (ICONT(I,NT1),I=1,3)                            S0500200
      NT1 = 2                                                           S0500210
      LINE = LINE+2+N                                                   S0500220
      GO TO 80                                                          S0500230
   50 LINE = LINE+N                                                     S0500240
      GO TO 80                                                          S0500250
   60 WRITE (JUNT,9004) (ICONT(I,NT3),I=1,3)                            S0500260
      NT3 = 2                                                           S0500270
      LINE = LINE+3+N                                                   S0500280
      GO TO 80                                                          S0500290
   70 IF (LL .NE. 2) GO TO 80                                           S0500300
      LINE = LINE-N                                                     S0500310
      GO TO 20                                                          S0500320
   80 CONTINUE                                                          S0500330
      RETURN                                                            S0500340
 9001 FORMAT (1H1,11H**** ISCLT ,13(1H*),1X,20A4,1X,08(1H*),6H PAGE ,I6,S0500350
     15H ****/)                                                         S0500360
 9002 FORMAT (/50X,20H- SOURCE INPUT DATA ,3A4//23H C T SOURCE SOURCE   S0500370
     1  ,1HX,11X,1HY,6X,16HEMISSION  BASE //58H A A NUMBER  TYPE  COORDIS0500380
     2NATE  COORDINATE  HEIGHT  ELEV- /,18X,36H- SOURCE DETAILS DEPENDINS0500390
     3G ON TYPE -/4H R P,18X,3H(M),9X,3H(M),8X,3H(M),3X,7HATION //4H D ES0500400
     4,48X,6H(M)  //1X,64(2H--))                                        S0500410
 9003 FORMAT (40X,19H- ISCLT INPUT DATA ,3A4/)                          S0500420
 9004 FORMAT (40X,36H- SUMMARY OF SOURCES OUTPUT TO TAPE ,3A4//11(12H NUS0500430
     1MBER/TYPE))                                                       S0500440
      END                                                               S0500450
      SUBROUTINE MXIMUM(IXS,IYS,ZMX,Z)                                  S0600010
      COMMON /DIM/ NSOURC,NXPNTS,NYPNTS,NXWYPT,NSEASN,NSPEED,NSTBLE,    S0600020
     1NSCTOR,ISW(20),UNITS(20),TITLE(20)                                S0600030
      COMMON /REST/ IUNT,JUNT,NXXYY,NXXYYP,ISTBLE(6),IFLG3,LINE,NLINES, S0600040
     1ICARD,NXPSS,NYPSS,MUNT,NUNT,ICONT(3,2),ITSAVE(572),NT1,NT2,NT3,NT4S0600050
     2,MSG7(4,3),MSG8(2),MSG9(2,2),MSG10(4,3),NGROUP,NOCOMB(20),IDSORC(2S0600060
     300),IEND,XSEA,ISAVSO(300),NG,NGT,NXWY                             S0600070
      DIMENSION IXS(1),IYS(1),ZMX(1),Z(1)                               S0600080
      DO 10 I=1,10                                                      S0600090
      IXS(I) = 0                                                        S0600100
      IYS(I) = 0                                                        S0600110
   10 ZMX(I) = 0.0                                                      S0600120
      N = 10                                                            S0600130
      J4 = 1                                                            S0600140
      JJ = 0                                                            S0600150
   20 JJ = JJ+1                                                         S0600160
      IF (JJ .GT. NYPNTS) GO TO 40                                      S0600170
      JJJ = (JJ-1)*NXPNTS                                               S0600180
      II = 0                                                            S0600190
   30 II = II+1                                                         S0600200
      IF (II .GT. NXPNTS) GO TO 20                                      S0600210
      IJ = JJJ+II                                                       S0600220
      GO TO 60                                                          S0600230
   40 IF (NXWYPT .LE. 0) GO TO 110                                      S0600240
      J4 = 2                                                            S0600250
      IJ = NXXYY                                                        S0600260
   50 IJ = IJ+1                                                         S0600270
      IF (IJ .GT. NXXYYP) GO TO 110                                     S0600280
      JJ = IJ+NYPSS                                                     S0600290
      II = IJ+NXPSS                                                     S0600300
   60 CONTINUE                                                          S0600310
      IF (Z(IJ) .LE. ZMX(N)) GO TO 100                                  S0600320
      L = 0                                                             S0600330
   70 L = L+1                                                           S0600340
      IF (L .GT. N) GO TO 100                                           S0600350
      IF (Z(IJ) .LE. ZMX(L)) GO TO 70                                   S0600360
      M = N+1                                                           S0600370
   80 M = M-1                                                           S0600380
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      IF (M .LE. L) GO TO 90                                            S0600390
      IXS(M) = IXS(M-1)                                                 S0600400
      IYS(M) = IYS(M-1)                                                 S0600410
      ZMX(M) = ZMX(M-1)                                                 S0600420
      GO TO 80                                                          S0600430
   90 ZMX(L) = Z(IJ)                                                    S0600440
      IXS(L) = II                                                       S0600450
      IYS(L) = JJ                                                       S0600460
  100 GO TO (30,50),J4                                                  S0600470
  110 CONTINUE                                                          S0600480
      RETURN                                                            S0600490
      END                                                               S0600500
      SUBROUTINE CHECKR(NN,NO)                                          S0700010
      COMMON /REST/ IUNT,JUNT,NXXYY,NXXYYP,ISTBLE(6),IFLG3,LINE,NLINES, S0700020
     1ICARD,NXPSS,NYPSS,MUNT,NUNT,ICONT(3,2),ITSAVE(572),NT1,NT2,NT3,NT4S0700030
     2,MSG7(4,3),MSG8(2),MSG9(2,2),MSG10(4,3),NGROUP,NOCOMB(20),IDSORC(2S0700040
     300),IEND,XSEA,ISAVSO(300),NG,NGT,NXWY                             S0700050
      COMMON /SORC/ NUMS,TYPE,DX,DY,H,ZS,TS,VEL,D,HB,BW,BL,NVS,VS(20),  S0700060
     1FRQ(20),GAMMA(20),Q(6,6,4),QFLG,WAKE                              S0700070
      IF (NN .GT. 0) GO TO 10                                           S0700080
      JJ = NOCOMB(NG)                                                   S0700090
      II = NGT                                                          S0700100
      GO TO 30                                                          S0700110
   10 II = 0                                                            S0700120
      I = 0                                                             S0700130
   20 I = I+1                                                           S0700140
      IF (I .GT. NN) GO TO 60                                           S0700150
      JJ = NOCOMB(I)                                                    S0700160
   30 IF (JJ .EQ. 0) GO TO 70                                           S0700170
      DO 50 J=1,JJ                                                      S0700180
      IF (IDSORC(J+II) .GE. 0) GO TO 40                                 S0700190
      IF (NUMS .GT. IABS(IDSORC(J+II))) GO TO 50                        S0700200
      IF (J .EQ. 1) GO TO 70                                            S0700210
      IF (IDSORC(J+II-1) .GE. 0.AND.NUMS .LT. IDSORC(J+II-1)) GO TO 50  S0700220
      GO TO 70                                                          S0700230
   40 IF (NUMS .EQ. IDSORC(J+II)) GO TO 70                              S0700240
   50 CONTINUE                                                          S0700250
      II = II+JJ                                                        S0700260
      IF (NN .GT. 0) GO TO 20                                           S0700270
   60 NO = 0                                                            S0700280
      GO TO 80                                                          S0700290
   70 CONTINUE                                                          S0700300
      NO = 1                                                            S0700310
   80 RETURN                                                            S0700320
      END                                                               S0700330
      SUBROUTINE SUMMER(AR1,AR2,L1)                                     S0800010
      COMMON /REST/ IUNT,JUNT,NXXYY,NXXYYP,ISTBLE(6),IFLG3,LINE,NLINES, S0800020
     1ICARD,NXPSS,NYPSS,MUNT,NUNT,ICONT(3,2),ITSAVE(572),NT1,NT2,NT3,NT4S0800030
     2,MSG7(4,3),MSG8(2),MSG9(2,2),MSG10(4,3),NGROUP,NOCOMB(20),IDSORC(2S0800040
     300),IEND,XSEA,ISAVSO(300),NG,NGT,NXWY                             S0800050
      DIMENSION AR1(1),AR2(1)                                           S0800060
      IF (L1 .LT. 0) GO TO 40                                           S0800070
      IF (L1 .EQ. 1) GO TO 20                                           S0800080
      DO 10 I=1,NXXYYP                                                  S0800090
   10 AR1(I) = AR1(I)+AR2(I)                                            S0800100
      GO TO 60                                                          S0800110
   20 DO 30 I=1,NXXYYP                                                  S0800120
   30 AR1(I) = AR2(I)                                                   S0800130
      GO TO 60                                                          S0800140
   40 DO 50 I=1,NXXYYP                                                  S0800150
   50 AR1(I) = AR1(I)*XSEA                                              S0800160
   60 RETURN                                                            S0800170
      END                                                               S0800180
      SUBROUTINE DISTR                                                  S0900010
C     CALC DISTANCE BETWEEN SOURCE AND RECEPTOR, DETERMINES IF RECEPTOR S0900020
C     IS IN THE CALCULATION SECTOR OR NOT AND CALCULATES THE SMOOTHING  S0900030
C     TERM                                                              S0900040
      COMMON /DIST/ XB,YB,XYP,TNN,TR,TRI,ARG,RP,RPI                     S0900050
      ARG = -1.0                                                        S0900060
      XF = XB+XYP                                                       S0900070
      F = XF*TNN                                                        S0900080
C     DETERMINE IF INSIDE CALC SECTOR. IF NOT THEN NO CALC              S0900090
      IF (ABS(YB) .GE. F) GO TO 10                                      S0900100
C     CALC RADIAL DISTANCE BETWEEN SOURCE AND RECEPTOR                  S0900110
      RP = SQRT(XF*XF+YB*YB)                                            S0900120
      RPI = 1.0/RP                                                      S0900130
C     CALC SMOOTHING TERM                                               S0900140
      F = XF*RPI                                                        S0900150
      IF (F .GT. 1.0) F = 1.0                                           S0900160
      F = ABS(TR-ACOS(F))*TRI                                           S0900170
      ARG = F*RPI                                                       S0900180
   10 RETURN                                                            S0900190
      END                                                               S0900200
      FUNCTION FUNCT(X,IST)                                             S1000010
C     CALCULATES AVERAGE B FOR VERTICAL TERM OF DEPOSITION EQUATION     S1000020
      COMMON /FUNCS/ AS(36),BS(36),PS(6),QS(6),CS(6),DS(6),ASI(36),BSI(3S1000030
     16),IA(7),JA(6),DST(31),IDP                                        S1000040
      XD = X*.001                                                       S1000050
      M = IA(IST)+1                                                     S1000060
      L = IA(IST+1)                                                     S1000070
      IF (IST .EQ. 1) L = L-1                                           S1000080
      I = JA(IST)                                                       S1000090
      AV = BS(I)                                                        S1000100
      DO 10 K=M,L                                                       S1000110
      IF (XD .LE. DST(K-1)) GO TO 20                                    S1000120
      I = I+1                                                           S1000130
      AV = AV+BS(I)                                                     S1000140
   10 CONTINUE                                                          S1000150
   20 FUNCT = AV/FLOAT(I-JA(IST)+1)                                     S1000160
      RETURN                                                            S1000170
      END                                                               S1000180
      SUBROUTINE VERTC1                                                 S1100010
C     CALCULATES THE VERTICAL TERM FOR THE CONCENTRATION EQUATION       S1100020
      COMMON /VERT/SIGZI,SIGZ,HM,H,V,VSROU,BA                           S1100030
      DATA SQ2PO2/1.253314137/                                          S1100040
      V = 0.0                                                           S1100050
      IF (SIGZI .GE. 0.0) GO TO 30                                      S1100060
      A = SIGZ/HM                                                       S1100070
      IF (A .GE. 1.6) GO TO 20                                          S1100080
      B = H*H*SIGZI                                                     S1100090
      IF (B .LT. -30.0) GO TO 30                                        S1100100
      V = EXP(B)                                                        S1100110
      B = 0.0                                                           S1100120
   10 B = B+2.0                                                         S1100130
      IF (B .GT. 6.0) GO TO 20                                          S1100140
      TR = B*HM                                                         S1100150
      TS = (TR-H)**2*SIGZI                                              S1100160
      IF (TS .LT. -10.0) GO TO 30                                       S1100170
      TR = (TR+H)**2*SIGZI                                              S1100180
      V = V+EXP(TS)+EXP(TR)                                             S1100190
      GO TO 10                                                          S1100200
   20 V = SQ2PO2*A                                                      S1100210
   30 CONTINUE                                                          S1100220
      RETURN                                                            S1100230
      END                                                               S1100240
      SUBROUTINE VERTC2(GAMMA)                                          S1200010
      COMMON /VERT/ SIGZI,SIGZ,HM,H,V,VSROU,BA                          S1200020
C     CALCULATES THE VERTICAL TERM IN THE CONCENTRATION EQUATION WHEN   S1200030
C     DEPOSITION IS OCCURRING                                           S1200040
      V = 0.0                                                           S1200050
      IF (SIGZI .GE. 0.0) GO TO 60                                      S1200060
      H1 =-H+VSROU                                                      S1200070
      H2 = H-VSROU                                                      S1200080
      A = H2*H2*SIGZI                                                   S1200090
      IF (A .LT. -40.0) GO TO 60                                        S1200100
      B = H1*H1*SIGZI                                                   S1200110
      IF (B .LT. -40.0) GO TO 10                                        S1200120
      V = EXP(B)                                                        S1200130
   10 IF (GAMMA .LE. 0.0) GO TO 20                                      S1200140
      V = V+EXP(A)*GAMMA                                                S1200150
   20 A = 1.0                                                           S1200160
      B = GAMMA                                                         S1200170
      C = B*B                                                           S1200180
      D = 0.0                                                           S1200190
   30 D = D+2.0                                                         S1200200
      TR = D*HM                                                         S1200210
      TS = (TR-H2)**2*SIGZI                                             S1200220
      IF (D .LE. 2.0.AND.TS .GT. -40.0) GO TO 40                        S1200230
      IF (TS .LT. -10.0) GO TO 60                                       S1200240
   40 VL = A*EXP(TS)                                                    S1200250
      IF (GAMMA .LE. 0.0) GO TO 50                                      S1200260
      TT = (TR+H1)**2*SIGZI                                             S1200270
      TQ = (TR-H1)**2*SIGZI                                             S1200280
      TR = (TR+H2)**2*SIGZI                                             S1200290
      VL = VL+B*(EXP(TT)+EXP(TQ))+C*EXP(TR)                             S1200300
      IF (VL .LE. V*1.0E-6) GO TO 50                                    S1200310
      V = V+VL                                                          S1200320
      A = B                                                             S1200330
      B = C                                                             S1200340
      C = C*GAMMA                                                       S1200350
      GO TO 30                                                          S1200360
   50 V = V+VL                                                          S1200370
   60 CONTINUE                                                          S1200380
```

```
      RETURN                                                            S1200390
      END                                                               S1200400
      SUBROUTINE VERTC3(GAMMA)                                          S1300010
      COMMON /VERT/ SIGZI,SIGZ,HM,H,V,VSROU,BA                          S1300020
      V = 0.0                                                           S1300030
      IF (SIGZI .GE. 0.0) GO TO 40                                      S1300040
      H1 = H-VSROU                                                      S1300050
      A = H1*H1*SIGZI                                                   S1300060
      IF (A .LT. -40.0) A = -40.0                                       S1300070
      V = V+(BA*H1+VSROU)*EXP(A)                                        S1300080
      A = 1.0                                                           S1300090
      B = GAMMA                                                         S1300100
      C = 0.0                                                           S1300110
   10 C = C+2.0                                                         S1300120
      TR = C*HM                                                         S1300130
      TS = (TR-H1)                                                      S1300140
      TR = (TR+H1)                                                      S1300150
      TT = TS*TS*SIGZI                                                  S1300160
      TQ = TR*TR*SIGZI                                                  S1300170
      IF (C .LE. 2.0) GO TO 20                                          S1300180
      IF (TT .LT. -10.0.AND.TQ .LT. -10.0) GO TO 40                     S1300190
   20 IF (TT .LT. -40.0) TT = -40.0                                     S1300200
      IF (TQ .LT. -40.0) TQ = -40.0                                     S1300210
      VL = A*(BA*TS-VSROU)*EXP(TT)+B*(BA*TR+VSROU)*EXP(TQ)              S1300220
      IF (GAMMA .LE. 0.0) GO TO 30                                      S1300230
      IF (VL .LE. V*1.0E-6) GO TO 30                                    S1300240
      V = V+VL                                                          S1300250
      A = B                                                             S1300260
      B = B*GAMMA                                                       S1300270
      GO TO 10                                                          S1300280
   30 V = V+VL                                                          S1300290
   40 CONTINUE                                                          S1300300
      RETURN                                                            S1300310
      END                                                               S1300320
      FUNCTION SIGMAZ(XP,IST)                                           S1400010
C     CALCULATES THE STANDARD DEVIATION OF THE VERTICAL CONCENTRATION   S1400020
C     DISTRIBUTION                                                      S1400030
      COMMON /FUNCS/ AS(36),BS(36),PS(6),QS(6),CS(6),DS(6),ASI(36),BSI(3S1400040
     16),IA(7),JA(6),DST(31),IDP                                        S1400050
C                                                                       S1400060
      XD = XP*.001                                                      S1400070
      K = 12                                                            S1400080
      IF (IST .EQ. 3) GO TO 30                                          S1400090
      M = IA(IST)                                                       S1400100
      L = IA(IST+1)-1                                                   S1400110
      IF (IST .EQ. 1.AND.IDP .NE. 0) L = L-1                            S1400120
      DO 10 K=M,L                                                       S1400130
      IF (XD .LE. DST(K)) GO TO 20                                      S1400140
   10 CONTINUE                                                          S1400150
      K = L+1                                                           S1400160
   20 K = K-M+JA(IST)                                                   S1400170
   30 SIGMAZ = AS(K)*XD**BS(K)                                          S1400180
      IF (IST .GT. 3.OR.IDP .NE.0) GO TO 40                             S1400190
      IF (SIGMAZ .GT. 5000.0) SIGMAZ = 5000.0                           S1400200
   40 CONTINUE                                                          S1400210
      RETURN                                                            S1400220
      END                                                               S1400230
      FUNCTION VIRTY(SIGYO,IST)                                         S1500010
C     CALCULATES LATERAL VIRTUAL DISTANCE                               S1500020
      COMMON /FUNCS/ AS(36),BS(36),PS(6),QS(6),CS(6),DS(6),ASI(36),BSI(3S1500030
     16),IA(7),JA(6),DST(31),IDP                                        S1500040
      VIRTY = (SIGYO*PS(IST))**QS(IST)*1.0E3                            S1500050
      RETURN                                                            S1500060
      END                                                               S1500070
      FUNCTION VIRTZ(SIGZO,IST,X,HB10)                                  S1600010
C     CALCULATES VERTICAL VIRTUAL DISTANCE                              S1600020
      COMMON /FUNCS/ AS(36),BS(36),PS(6),QS(6),CS(6),DS(6),ASI(36),BSI(3S1600030
     16),IA(7),JA(6),DST(31),IDP                                        S1600040
C                                                                       S1600050
      XD = X*.001                                                       S1600060
      XE = HB10*.001                                                    S1600061
      K = 12                                                            S1600070
      IF (IST .EQ. 3) GO TO 30                                          S1600080
      M = IA(IST)                                                       S1600090
      L = IA(IST+1)-1                                                   S1600100
      IF (IST .EQ. 1) L = L-1                                           S1600110
      DO 10 K=M,L                                                       S1600120
      IF (XD .LE. DST(K)) GO TO 20                                      S1600130
   10 CONTINUE                                                          S1600140
      K = L+1                                                           S1600150
   20 KK = K                                                            S1600160
      K = K-M+JA(IST)                                                   S1600170
   30 VIRTZ = (SIGZO*ASI(K))**BSI(K)-XE                                 S1600180
      IF (VIRTZ .LT. 0.0) VIRTZ = 0.0                                   S1600190
      IF (IST.EQ.3.OR.KK.GT.L.OR.VIRTZ+XD.LE.DST(KK)) GO TO 40          S1600200
      K = KK+1                                                          S1600210
      GO TO 20                                                          S1600220
   40 VIRTZ = VIRTZ*1.0E3                                               S1600230
      RETURN                                                            S1600240
      END                                                               S1600250
```

APPENDIX C

EXAMPLE EXECUTIONS OF THE ISC SHORT-TERM MODEL (ISCST) COMPUTER PROGRAM

C.1 INTRODUCTION

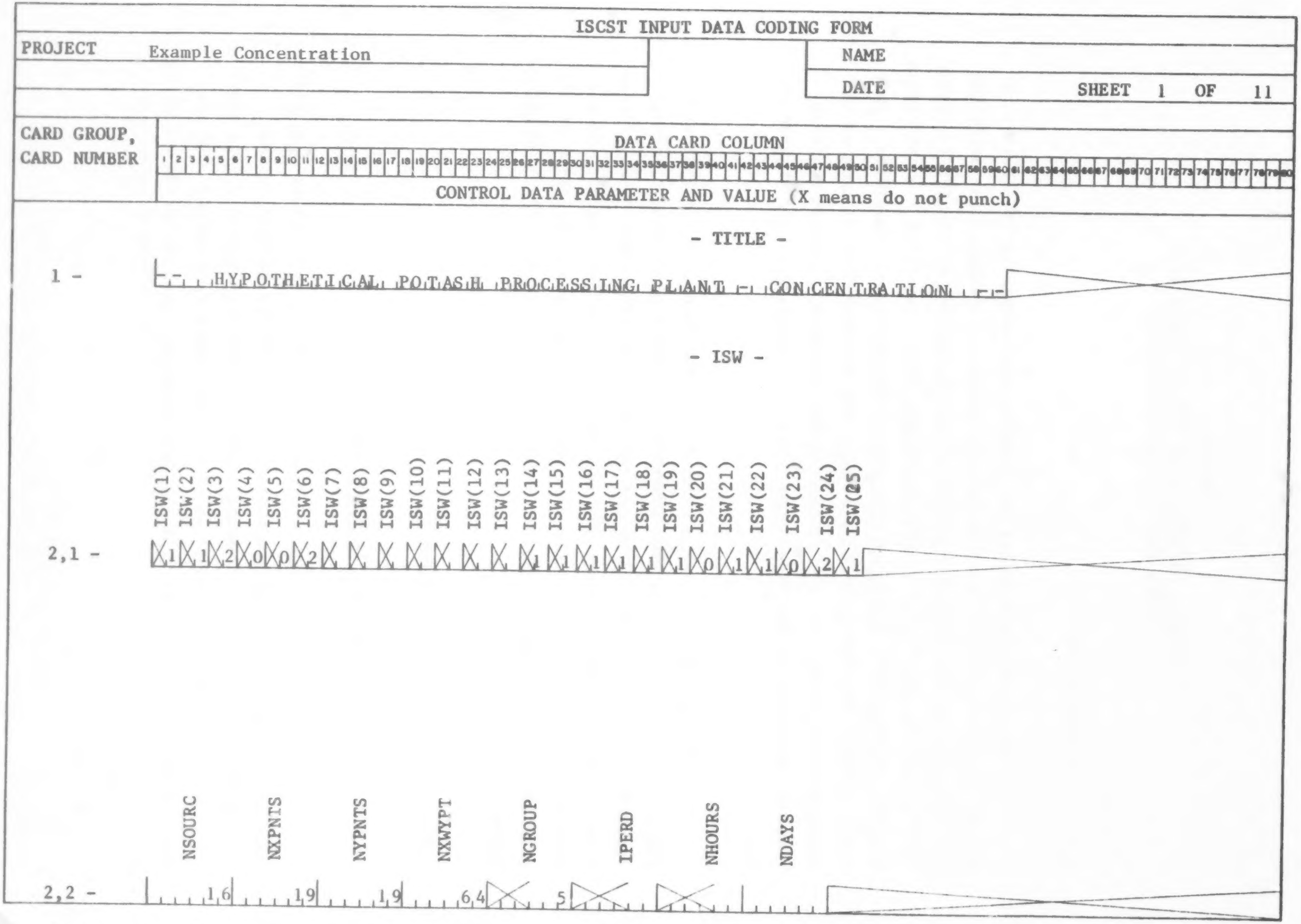
The following examples are problem runs using the ISC short-term (ISCST) program to model the hypothetical potash processing plant described in Section 2.6. The examples consist of two executions of the ISCST program over ten "worst-case" days of meteorological data. The first run calculates average concentration and the second run calculates total deposition. The topics covered in this appendix are: (1) the procedure for setting up the required input data; (2) the procedures for estimating program run time, required data storage and page output; and (3) examples of the program output.

In this section, it is assumed that the reader is familiar with Section 2.6, which discusses the hypothetical potash processing plant and provides the reader with figures and tables of specific input data information. Also, the reader should be familiar with Table 3-4 presented in Section 3.2.3.a, which provides the user with the format and description of all card input data parameters, and with Equations (3-1) through (3-5) described throughout Section 3.2.

C.2 EXAMPLE CONCENTRATION RUN

C.2.1 Input Data Set-Up Procedure

Figure C-1 shows the 87 lines of card input data values required to compute the desired average concentrations for the hypothetical potash processing plant. The blank coding forms are used from Appendix E in order to show the column field positions of all card input data values. To the left of each coding form line is the Card Group and card number in which the



ISCST INPUT DATA CODING FORM

PROJECT Example Concentration

NAME

DATE

SHEET 1 OF 11

CARD GROUP, CARD NUMBER

DATA CARD COLUMN

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80

CONTROL DATA PARAMETER AND VALUE (X means do not punch)

- TITLE -

1 - HYPOTHETICAL POTASH PROCESSING PLANT - CONCENTRATION

- ISW -

2,1 -

ISW(1)	X 1
ISW(2)	X 1
ISW(3)	X 2
ISW(4)	X 0
ISW(5)	X 0
ISW(6)	X 2
ISW(7)	X
ISW(8)	X
ISW(9)	X
ISW(10)	X
ISW(11)	X
ISW(12)	X
ISW(13)	X
ISW(14)	X 1
ISW(15)	X 1
ISW(16)	X 1
ISW(17)	X 1
ISW(18)	X 1
ISW(19)	X 1
ISW(20)	X 0
ISW(21)	X 1
ISW(22)	X 1
ISW(23)	X 0
ISW(24)	X 2
ISW(25)	X 1

2,2 -

NSOURC	16
NXPNTS	19
NYPNTS	19
NXWYPT	64
NGROUP	X 5
IPERD	X
NHOURS	X
NDAYS	

FIGURE C-1. Card input data values for the hypothetical potash processing plant concentration run.

ISCST INPUT DATA CODING FORM (Continued)

PROJECT Example Concentration

NAME

DATE SHEET 2 OF 11

CARD GROUP, CARD NUMBER

DATA CARD COLUMN

RECEPTOR DATA PARAMETER AND VALUE

- GRIDX (axis of grid system, omit if NXPNTS OR NYPNTS = 0) -

3,1 -	-3000	-2000	-1500	-1250	-1000	-800	-600	-400
	-200	0	200	400	600	800	1000	1250
	1500	2000	3000					

- GRIDY (axis of grid system, omit if NXPNTS or NYPNTS = 0) -

3,2 -	-3000	-2000	-1500	-1250	-1000	-800	-600	-400
	-200	0	200	400	600	800	1000	1250
	1500	2000	3000					

FIGURE C-1. (Continued)

ISCST INPUT DATA CODING FORM (Continued)

PROJECT Example Concentration

NAME

DATE

SHEET 3 **OF** 11

CARD GROUP, CARD NUMBER

DATA CARD COLUMN

RECEPTOR DATA PARAMETER AND VALUE

- XDIS (discrete receptors, omit if NXWYPT = 0) -

3,3 -	555	620	685	735	800	800	900	920
	940	940	935	910	950	1015	1055	1075
	1075	1045	995	910	855	755	620	525
	460	355	355	355	355	350	345	335
	325	380	420	450	480	505	535	575
	620	665	705	730	745	755	755	745
	730	705	690	690	690	680	665	645
	615	575	530	475	410	365	365	410

- YDIS (discrete receptors, omit if NXWYPT = 0) -

3,4 -	317	318	320	322	326	331	336	341
	346	351	356	1	6	11	16	21
	26	31	36	41	43	45	47	49
	51	56	66	76	86	96	106	116
	126	136	141	146	151	156	161	166
	171	176	181	186	191	196	201	206
	211	216	221	226	231	236	241	246
	251	256	261	266	271	276	286	296

FIGURE C-1. (Continued)

ISCST INPUT DATA CODING FORM (Continued)

PROJECT Example Concentration

NAME

DATE SHEET 4 OF 11

CARD GROUP, CARD NAME

DATA CARD COLUMN

SOURCE GROUP DATA PARAMETER AND VALUE (X means do not punch)

- NSOGRP (array, omit if NGROUP = 0) -

4,1 -	1	2	2	1	2															

- IDSOR (array, omit if NGROUP = 0) -

4,2 -	1	2	-11	12	-15	16	1	-16					

FIGURE C-1. (Continued)

ISCST INPUT DATA CODING FORM (Continued)

PROJECT Example Concentration

NAME

DATE SHEET 5 OF 11

CARD GROUP, CARD NUMBER

DATA CARD COLUMN

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80

METEOROLOGICAL CONSTANTS DATA PARAMETER AND VALUE (X means do not punch)

- PDEF (array, omit if ISW(21) ≠ 2) -

5,1-6 -

- DTHDEF (array, omit if ISW(22) ≠ 2) -

5,7-12 -

ZR - UCATS (array) -

5,13 - - one blank card, default units -

FIGURE C-1. (Continued)

ISCST INPUT DATA CODING FORM (Continued)

PROJECT Example Concentration

NAME

DATE SHEET 6 OF 11

DATA CARD COLUMN

CARD GROUP, CARD NUMBER

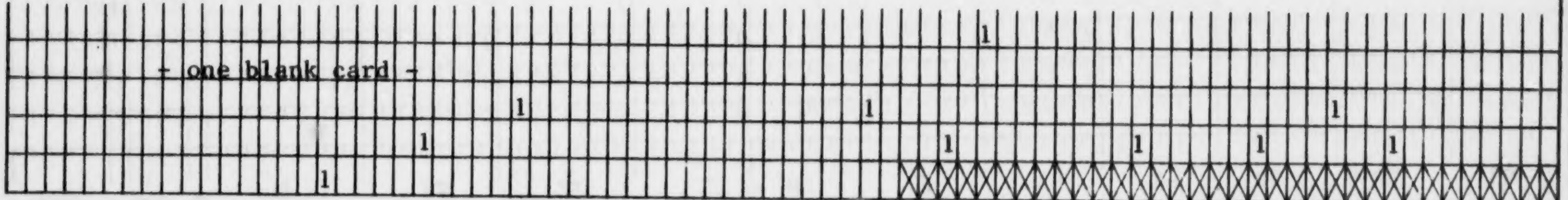
METEOROLOGICAL CONSTANTS AND IDENTIFICATION LABEL DATA PARAMETER AND VALUE (X means do not punch)

5,14 -

TK	BETA1	BETA2	DECAY	IQUN	ICHIUN	IMET	ITAP	
- one blank card, default units -								X

- IDAY (array, omit if ISW(19) = 2) -

5,15-19 -



- (omit if ISW(19) = 2) -

5,20 -

ISS	ISY	IUS	IUY	
14913	64	14918	64	X

FIGURE C-1. (Continued)

ISCST INPUT DATA CODING FORM (Continued)

PROJECT	Example Concentration	NAME	
		DATE	SHEET 7 OF 11

CARD GROUP, CARD NUMBER

DATA CARD COLUMN

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80

SOURCE DATA PARAMETER AND VALUE

6,1 -

NSO	ITYPE	WAKE	NVS	QFLG	Q	XS	YS	ZS	HS	TS	VS	D	HB	HL	HW
1	2		63		.1	-13.3	-13.3	0	10.0		26.6				
2	1		60		.13	20	0	0	.9	1	4.7				
3	1		60		.13	30	0	0	2.6	1	4.7				
4	1		60		.13	40	0	0	4.3	1	4.7				
5	1		60		.13	49	0	0	6.1	1	4.7				
6	1		60		.13	59	0	0	7.8	1	4.7				
7	1		60		.13	69	0	0	9.6	1	4.7				
8	1		60		.13	79	0	0	11.3	1	4.7				
9	1		60		.13	89	0	0	13.0	1	4.7				
10	1		60		.13	99	0	0	14.8	1	4.7				
11	1		60		.13	109	0	0	16.5	1	4.7				
12	1		00		2.63	121	0	0	22.5	11.6	10.8				
13	1		00		2.63	144	0	0	22.5	11.6	10.8				
14	1		00		2.63	167	0	0	22.5	11.6	10.8				
15	1		00		2.63	190	0	0	22.5	11.6	10.8				
16	0	0	00		5.0	201	0	0	50.0	340	8	1	25	90	50

IGURE C-1.   (Continued)

ISCST INPUT DATA CODING FORM (Continued)

PROJECT Example Concentration

NAME

DATE SHEET 8 OF 11

CARD GROUP, CARD NUMBER

DATA CARD COLUMN

SOURCE DATA PARAMETER AND VALUE

- PHI (array, omit if NVS = 0 for all sources) -

CARD GROUP, CARD NUMBER	1–10	11–20	21–30	31–40	41–50	51–60	61–70	71–80
	.1	.4	.28	.12	.06	.04		
	.1	.4	.28	.12	.06	.04		
	.1	.4	.28	.12	.06	.04		
	.1	.4	.28	.12	.06	.04		
	.1	.4	.28	.12	.06	.04		
	.1	.4	.28	.12	.06	.04		
	.1	.4	.28	.12	.06	.04		
	.1	.4	.28	.12	.06	.04		
	.1	.4	.28	.12	.06	.04		
	.1	.4	.28	.12	.06	.04		
6,2 -	.1	.4	.28	.12	.06	.04		

FIGURE C-1. (Continued)

ISCST INPUT DATA CODING FORM (Continued)

PROJECT Example Concentration

NAME

DATE SHEET 9 OF 11

CARD GROUP, CARD NUMBER

DATA CARD COLUMN 1–80

SOURCE DATA PARAMETER AND VALUE

- VSN (array, omit if NVS = 0 for all sources) -

CARD GROUP, CARD NUMBER								
	.001	.007	.019	.037	.061	.099		
	.001	.007	.019	.037	.061	.099		
	.001	.007	.019	.037	.061	.099		
	.001	.007	.019	.037	.061	.099		
	.001	.007	.019	.037	.061	.099		
	.001	.007	.019	.037	.061	.099		
	.001	.007	.019	.037	.061	.099		
	.001	.007	.019	.037	.061	.099		
	.001	.007	.019	.037	.061	.099		
	.001	.007	.019	.037	.061	.099		
6,3 -	.001	.007	.019	.037	.061	.099		

IGURE C-1. (Continued)

ISCST INPUT DATA CODING FORM (Continued)

PROJECT Example Concentration

NAME

DATE SHEET 10 OF 11

CARD GROUP, CARD NUMBER

DATA CARD COLUMN

SOURCE DATA PARAMETER AND VALUE

- GAMMA (array, omit if NVS = 0 for all sources) -

6,4 -	1.0	.82	.72	.65	.59	.5		
	1.0	.82	.72	.65	.59	.5		
	1.0	.82	.72	.65	.59	.5		
	1.0	.82	.72	.65	.59	.5		
	1.0	.82	.72	.65	.59	.5		
	1.0	.82	.72	.65	.59	.5		
	1.0	.82	.72	.65	.59	.5		
	1.0	.82	.72	.65	.59	.5		
	1.0	.82	.72	.65	.59	.5		
	1.0	.82	.72	.65	.59	.5		
	1.0	.82	.72	.65	.59	.5		

FIGURE C-1 (Continued)

ISCST INPUT DATA CODING FORM (Continued)

PROJECT Example Concentration

NAME

DATE SHEET 11 OF 11

CARD GROUP, CARD NUMBER

DATA CARD COLUMN

SOURCE DATA PARAMETER AND VALUE

- QTK (array, omit if ISW(23) = 0 and QFLG = 0 for all sources) -

6,5 -	1	1	1	1	1	1	1	5
	5	5	5	5	5	5	5	1
	1	1	1	1	1	1	1	1

FIGURE C-1. (Continued)

input data values on that line are defined in Table 3-4. Also, note that some coding form lines are marked "blank card" and are to be included in the input data deck as blank cards. This is because a zero value, which is equivalent to blank spaces, is the proper value of an input data parameter or because it is convenient to exercise the program's default capabilities for certain input parameters.

The best procedure for setting up the card input data for a problem run is to consider all of the ISCST program's card input data parameters covered in Table 3-4. As each card input data parameter in Table 3-4 is examined, Section 2.6 is consulted, when necessary, in order to obtain the applicable information for that parameter.

a. Card Group 1. The first input data parameter discussed in Table 3-4 is TITLE whose alphanumeric heading data occupies the first 60 characters of the first line as shown in Figure C-1.

b. Card Group 2. The second line consists of the ISW array where each entry is entered in 2-column integer fields. Because it is desired to calculate concentration values, a "1" is entered in column 2 according to ISW(1) in Table 3-4. Figure 2-3 is an illustration of the Cartesian receptor grid at which average concentration values are calculated. A "1" is entered in column 4 for ISW(2) to indicate that the receptor grid locations are referenced by the Cartesian coordinate system. Note that a "3" could not be entered in column 4 to indicate that a receptor grid will be generated by the program because the receptor grid used does not have equally spaced grid points. Although no mention of discrete receptor points is made in Section 2.6, this problem run includes 64 discrete receptor points which are oriented with respect to the receptor grid origin* by distance and direction. Hence, a "2" is entered in column 6 for ISW(3) to indicate to the program that the discrete receptor points are referenced as polar coordinates. ISW(4) indicates whether or not receptor terrain elevations are input. According to Section 2.6, the terrain is relatively flat; hence, a "0" is entered in column 8 for ISW(4). Column 10 for ISW(5) is set to "0" since no output tape is desired. Column 12 for ISW(6) is set to "2" in order to obtain a listing of all input data. ISW(7) through ISW(14) indicate which time periods are considered by the program for the average concentration calculations. According to Section 2.6, only 24-hour average concentration values are desired. The descriptions of ISW(7) through ISW(14) in Table 3-4 state that only ISW(14) should be set to "1". Hence, columns 13 to 26 for ISW(7) to ISW(13) are blank (equivalent to "0") and column 28 for ISW(14) is set to "1". ISW(15) through ISW(18) indicate to the program which types of output tables are produced. For the purpose of illustration, all types of output tables are produced. A "1" is entered in columns 30, 32, 34 and 36 for ISW(15) through ISW(18) for "N"-day, daily, highest and second highest and maximum 50 tables, respectively. The hourly meteorological data reside on a file in a format generated by the preprocessor program; hence a "1" is entered in column 38 for ISW(19) to indicate to the program the format of the hourly meteorological data. According to Section 2.6, a rural mode is desired; hence, a "0" is entered in column 40 for ISW(20). The descriptions of ISW(21) and ISW(22) indicate whether or not the user should provide wind-profile exponents and vertical potential temperature gradients. Because no site-specific wind-profile exponents and vertical potential temperature gradients are given in Section 2.6, column 41 for ISW(21) and column 42 for ISW(22) are set to "1" in order to use the program default values. ISW(23) indicates whether or not scalars are input to vary the average emission rates for all sources. According to Section 2.6, only one source (the ore pile) has a variational emission rate. A "0" is then entered in column 46 of ISW(23) to indicate that this option is not desired for all sources. Because wake effects are to be considered, the distance-dependent plume rise should be used. This is indicated by setting ISW(24) to "2". The physical stack heights of all sources (in this example, only Source 16 is considered) are not modified due to stack-tip downwash, which is indicated by setting ISW(25) to "1".

---

*The origin for this example problem run has been (arbitrarily) defined at the center of the ore storage pile (Source 1).

The second line of Card Group 2 (the third card image) completes this Card Group as shown in Figure C-1. A "16" is entered for the number of sources (NSOURC) in columns 1-6. This value is obtained from Table 2-13 which lists all sources required to model the hypothetical potash processing plant. The next three parameters discussed in this Card Group pertain to the size of the receptor grid and number of discrete receptor points. By counting the number of X- and Y-axis grid points in Figure 2-3, a "19" value is entered in both columns 7-12 and 13-18 for parameters NXPNTS and NYPNTS. For the purpose of illustration, 64 discrete receptor points are used in this example run. NGROUP specifies the number of source group combinations desired. According to Section 2.6, it is of interest to see the contributions from the ore pile (Source 1), the conveyor belt (Sources 2-11), the roof monitor (Sources 12-15), the stack (Source 16) and the plant as a whole (Sources 1-16). Hence, a "5" is entered in column 30 for the number of source groups. Columns 31-36 for IPERD are left blank because all 24-hour time periods per day are to be printed. IPERD is intended for use only for time periods less than 24 hours. The following two parameters, NHOURS and NDAYS, are not applicable for this example run because these parameters apply only when hourly meteorological data are in a card image format (ISW(19) = "2"); the program then ignores any data contained in columns 37 through 48.

c. Card Group 3. This Card Group contains the locations of the receptor grid points and discrete receptor points. For this example problem run, this Card Group consists of lines (card images) 4 through 25 as shown in Figure C-1. According to Table 3-4, the X-axis grid locations are entered first in GRIDX with 8 values per line in ten-column fields continuing onto other lines (card images) as needed. Similarly, the Y-axis locations are then entered in GRIDY beginning a new line (card image) in the same fashion as the X-axis locations. It is assumed that the receptor grid values represented in Figure 2-3 are in meters which are the units required by the program. Beginning with the seventh line (card image) of this Card Group, 64 discrete range values are entered for XDIS followed by 64 discrete direction values, beginning with the fifteenth line of this Card Group, for YDIS. The discrete receptor values are also entered in 8 ten-column fields continuing onto other lines as needed. Because the receptor terrain is relatively flat, no receptor terrain elevations are entered for GRIDZ.

d. Card Group 4. Because source group combinations are desired in this example problem run (NGROUP>"0"), it is necessary to specify which sources constitute each source group. The first line of this Card Group consists of the values entered for parameter NSOGRP. According to Section 2.6, the source numbers which define each source group are 1, 2-11, 12-15, 16 and 1-16. Values of "1", "2", "2", "1" and "2" are entered in columns 4, 8, 12, 16 and 20, respectively, for NSOGRP because each value is the number of source numbers which must be read from the IDSOR array in order to define a source group. The next line (parameter IDSOR) consists of the source numbers which define each source group. Note that the minus sign preceding a source number implies inclusive summing from the previous source number entered to the source number with the minus sign.

e. Card Group 5. Because no special wind profile exponents and vertical potential temperature gradients are considered, parameters ISW(21) and ISW(22) described in Card Group 2 are set to "1", directing the program not to read the first two parameters, PDEF and DTHDEF, of this Card Group. Hence, the first line of this Card Group consists of parameters ZR and UCATS. This line is completely blank because it is assumed that the wind speed reference height is the default value (10 meters) and because no special consideration is mentioned in Section 2.6 regarding wind speed categories. Similarly, the next line is blank because all parameters contained on the line may default to program-provided values. That is, the default values for TK, IQUN and ICHIUN may be used since the emission rate units of all sources given in Table 2-13 are the same as the program's default units and it is assumed that the desired units of the average concentration values are the same as the program's default units. Also, no mention is made in Section 2.6 regarding special adjustment of the adiabatic or stable entrainment coefficients (BETA1 and BETA2) or chemical depletion (DECAY). Furthermore, it is assumed that the hourly meteorological data file is associated with FORTRAN logical unit number 9 (the program's default value for IMET) as discussed in Section 3.2.2.a. The next 5 lines of this Card Group (the third through seventh line of this Card Group), consist of the IDAY array and are read by the program since ISW(19) equals "1". In this array, the Julian Days of the ten "worst-case" days of meteorological data (not discussed in Section 2.6) are specified. For this case, the Julian Days are 51, 187, 205, 229, 262, 289, 299, 305, 312 and 337 which respectively correspond to column 51 of line 1, columns 27, 45 and 69 of line 3, columns 22, 49, 59, 65 and 72 of line 4 and column 17 of line 5. Hence, a "1" is entered in those 10 columns as shown in Figure C-1. The last line of this Card Group contains input data parameters which also pertain to the hourly meteorological data file and must be entered since ISW(19) equals "1". The surface and upper air station numbers and the years of the data are entered according to the formats of parameters ISS, ISY, IUS and IUY described in Table 3-4.

f. Card Group 6. This Card Group consists of all source data whose values are provided by Tables 2-12, 2-13 and 2-14 in Section 2.6. For each of the 16 sources, one main card of values contains most, if not all, of the data required for a source. This card consists of parameters NSO through HW described in Table 3-4. According to Section 2.6, the ore pile (Source 1) and the conveyor belt (Sources 2-11) have significant particulate emissions which requires 6 gravitational particulate categories of data as shown in Table 2-12. Hence, a "6" is entered in column 9 for NVS for Sources 1-11 which directs the program to read the gravitational particulate data for PHI, VSN and GAMMA immediately following the main source card for which the particulate data are applicable. Note that Figure C-1 does not show each set of gravitational particulate data immediately following the main source card. The coding forms are designed more for an efficient manner of preparing the input data. Because particulate emissions from sources 12-16 do not have significant settling velocities, column 9 for NVS is "0" and no particulate data are read by the program for these sources. Because the emission rate for the ore pile (Source 1) varies depending on the hour of the day (see Table 2-14), a "3" is entered in column 10 for QFLG for Source 1. The "3" value, which is the value required by the program in order to vary emission rates for each hour of the day, directs the program to read one set of 24 source emission rate scalars in QTK. Note that QTK is read after all other source input data are entered and consists of the last 3 lines (card images) of this Card Group. According to Table 2-14, the emission rate for Source 1 equals 0.1 grams per second per square meter for hours 01-07 and 16-24, and equals 0.5 for hours 08-15. A value of 0.1 is entered in columns 11-18 for the emission rate Q for Source 1. Then, scalar values of 1.0 are entered for the first seven values (hours 01-07) and for the last nine values (hours 16-24) in QTK since no scaling is needed for the emission rate of Source 1 for those hours. The eighth through fifteenth scalar values (hours 08-15) equal 5.0 since it is desired to scale the source emission rate from 0.1 to 0.5 for those hours. The values in QTK are entered in 8 ten-column fields and continue onto other lines (card images) as needed. In this case, QTK consists of three lines.

The card deck described above completes the required card input data for computing the desired average concentration values for the hypothetical potash processing plant. Because the hourly meteorological data are read from an external file (because ISW(19) = "1"), Card Group 7 is not read by the program. The external hourly meteorological data file must be assigned and associated to FORTRAN logical unit 9 before execution of the program (see Section 3.2.2.a).

C.2.2 Run Time, Required Data Storage and Program Output Estimates

The number of minutes the program takes to execute this example run may be estimated by Equation (3-2) described in Section 3.2.5.a. The six variables which determine the amount of time are: (1) NHOURS, which equals "24" since there are 24 hours in a day of meteorological data; (2) NDAYS, which equals "10" since ten "worst-case" days are being processed; (3) NSOURC, which equals "16"; (4) NGROUP, which equals "5"; (5) NPNTS, which equals 19 times 19 plus 64 for a total of 425 receptor points; and (6) NAVG, which equals "1" for one time period. With these values and the value of C equal to 2.1×10^{-5} we have

$$\begin{aligned}\text{Number of Minutes} &= C \cdot (\text{NDAYS} + 1) \cdot (1 + \text{NHOURS} \cdot (1 + 0.8 \\ &\quad \cdot \text{NSOURC} \cdot (1 + 0.6 \cdot \text{NPNTS} + 0.1 \cdot \text{NGROUP} \\ &\quad \cdot \text{NAVG}))) \\ &= 2.1 \cdot 10^{-5} \, (10 + 1) \cdot (1 + 24 \cdot (1 + 0.8 \\ &\quad \cdot 16 \cdot (1 + 0.6 \cdot 425 + 0.1 \cdot 5 \cdot 1))) \\ &= 18.2 \text{ minutes}\end{aligned} \tag{C-1}$$

The number of data storage locations required by the program may be computed by Equation (3-1) described in Section 3.2.3.a. According to the definitions of the parameters used in Equation (3-1), NSOURC equals "16", NXPNTS equals "19", NYPNTS equals "19, NXWYPT equals "64", NPNTS equals "425", NAVG equals "1" and NGROUP equals "5" for this example run. Also, because ISW(15), ISW(17) and ISW(8) equal "1", variables A, B and C respectively equal 425 times 5 (or 2125), 4 times 1 times 425 times 5 (or 8500), and 201 times 1 times 5 (or 1005) according to their definitions given in Equation (3-1). Substituting these values into Equation (3-1) gives

$$\begin{aligned}\text{Required Data Storage} &= \text{NPNTS} \cdot (\text{NAVG} \cdot \text{NGROUP} + 2) + \text{NXPNTS} \\ &\quad + \text{NYPNTS} + 2 \cdot \text{NXWYPT} + 215 \cdot \text{NSOURC} \\ &\quad + A + B + C \\ &= 425 \cdot (1 \cdot 5 + 2) + 19 + 19 + 2 \cdot 64 \\ &\quad + 215 \cdot 16 + 2125 + 8500 + 1005 \\ &= 18211 \text{ words}\end{aligned} \tag{C-2}$$

This value is well within the current limit of 43500 words allocated by the program. If this value exceeded 43500 words, it would be necessary to segment the example problem run into more than one run or to modify the current allocated data limit set in the program (see Section 3.2.7).

Equations (3-3), (3-4) and (3-5) in Section 3.2.5.b assist in computing the number of pages of output data produced for a problem run. Because the program has different categories of print output, it is best to examine the number of pages produced by each category. In this case, all categories have been set to generate print output.

Because ISW(6) equals "2", 5 pages of input data are listed plus 10 pages for the 10 days of hourly meteorological data. Also, because either QFLG or NVS is greater than "0" for 11 sources, about another 4 pages are added for a total of about 19 pages for this category.

The number of "N"-day average concentration tables produced (since ISW(15) = "1") equals the number of source groups specified in parameter NGROUP and equals "5" for this example problem run. However, we must consider the number of pages produced by each table according to Equation (3-3). As shown by the definitions of the parameters contained in Equation (3-3), the number of pages produced per table depends on the receptor grid size and the number of discrete receptors. In this case, NXPNTS equals "19", NYPNTS equals "19" and NXWYPT equals "64" which, when substituted into Equation (3-3), gives

$$\begin{aligned}\text{Pages Per Table} &= \left(\frac{\text{NXPNTS}}{9}\right) \cdot \left(\frac{\text{NYPNTS}}{38}\right) + \left(\frac{\text{NXWYPT}}{114}\right) \\ &= \left(\frac{19}{9}\right) \cdot \left(\frac{19}{38}\right) + \left(\frac{64}{114}\right) \\ &= (3) \cdot (1) + (1) \qquad \text{(C-3)} \\ &= 4 \text{ pages}\end{aligned}$$

Note that any fractional number is rounded up to the nearest whole number. Hence, the total number of pages produced by this category for this example problem run equals 5 tables times 4 pages per table for a total of 20 pages.

Equation (3-4) gives the number of daily tables produced (ISW(16) = "1") for each day of meteorological data. As shown, the number of tables produced each day is a function of the number of source groups, whether the "N"th time interval or all time intervals for each time period are desired, and the number of time periods. For this example problem, Equation (3-4) yields

$$\begin{aligned}\text{Number of Tables} &= \text{NGROUP} \cdot \Big((24/\text{IPERD}) \cdot \text{ISW}(7) \\ &\quad + (12/\text{IPERD}) \cdot \text{ISW}(8) + (8/\text{IPERD}) \cdot \text{ISW}(9) \\ &\quad + (6/\text{IPERD}) \cdot \text{ISW}(10) + (4/\text{IPERD}) \cdot \text{ISW}(11) \\ &\quad + (3/\text{IPERD}) \cdot \text{ISW}(12) + (2/\text{IPERD}) \cdot \text{ISW}(13) \\ &\quad + (1/\text{IPERD}) \cdot \text{ISW}(14)\Big) \qquad \text{(C-4)} \\ &= 5 \cdot \Big((24) \cdot 0 + (12) \cdot 0 + (8) \cdot 0 + (6) \cdot 0 \\ &\quad + (4) \cdot 0 + (3) \cdot 0 + (2) \cdot 0 + (1) \cdot 1\Big) \\ &= 5 \text{ tables}\end{aligned}$$

Note that because input parameter IPERD has been set to "0", all terms of the form (j/IPERD) reduce to (j). Hence, for all 10 days, 50 tables are produced by this category. Again, Equation (3-3) yields 4 pages per table for a total of 50 tables times 4 pages per table, or a total of 200 pages for this output category.

Because ISW(17) equals "1", tables of the highest and second highest calculated 24-hour concentrations are produced for this example run. According to Section 3.2.5.b the number of tables produced equals twice the number of time periods (equals "1" for the one 24-hour averaging period) times the number of source groups (equals "5" for this example run) for a total of 10 tables. The number of pages produced by each table is given by Equation (3-5). Again, the number of pages produced per table depends on the receptor grid and number of discrete points. Substituting the same values used in Equation (3-5) yields

$$
\begin{aligned}
\text{Number of Pages} &= \left(\frac{\text{NXPNTS}}{5}\right) \cdot \left(\frac{\text{NYPNTS}}{38}\right) + \left(\frac{\text{NXWYPT}}{76}\right) \\
&= \left(\frac{19}{5}\right) \cdot \left(\frac{19}{38}\right) + \left(\frac{64}{76}\right) \qquad \text{(C-5)} \\
&= (4) \cdot (1) + (1) \\
&= 5 \text{ pages}
\end{aligned}
$$

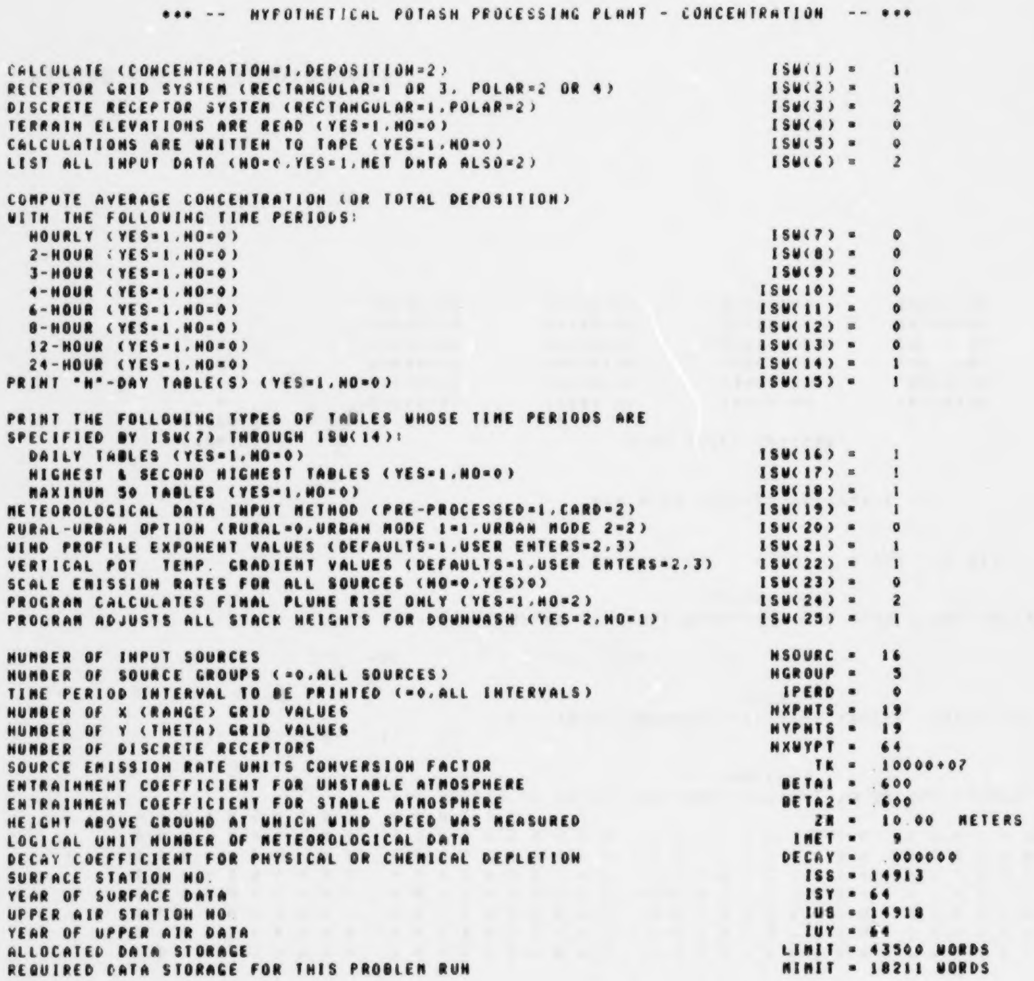
Hence, the total number of pages produced by this category equals 10 tables times 5 pages per table or 50 pages.

The final category of print output is the maximum 50 tables produced when ISW(18) equals "1", as it is in this case. The number of tables produced equals the number of time periods desired (equals "1" for the one 24-hour averaging period) times the number of source groups (equals "5" for this case) for a total of 5 tables. Because each table produced by this category is a maximum of one page, a total of 5 pages is produced by this category.

By summing the number of pages generated for each applicable output category, an estimate of the total number of pages printed for this example run may be obtained. For ISW(6), ISW(15), ISW(16), ISW(17) and ISW(18), the number of pages equals 19 plus 20 plus 200 plus 50 plus 5, respectively, for a total of 294 pages printed for this problem run. Because no output tape is generated (ISW(5) = "0"), the 294 page output estimate represents the total program output for this problem run.

C.2.3 Output Format

Figures C-2 through C-8 illustrate the content and format of the print output produced by this example run. Figures C-2 and C-3 are generated since ISW(6) equals "2" in this problem run. Figure C-3 is a listing of one day of the ten days of hourly meteorological data. Because the pro-



```
*** --  HYPOTHETICAL POTASH PROCESSING PLANT - CONCENTRATION  -- ***

CALCULATE (CONCENTRATION=1,DEPOSITION=2)                            ISW(1) =   1
RECEPTOR GRID SYSTEM (RECTANGULAR=1 OR 3, POLAR=2 OR 4)             ISW(2) =   1
DISCRETE RECEPTOR SYSTEM (RECTANGULAR=1,POLAR=2)                    ISW(3) =   2
TERRAIN ELEVATIONS ARE READ (YES=1,NO=0)                            ISW(4) =   0
CALCULATIONS ARE WRITTEN TO TAPE (YES=1,NO=0)                       ISW(5) =   0
LIST ALL INPUT DATA (NO=C,YES=1,MET DATA ALSO=2)                    ISW(6) =   2

COMPUTE AVERAGE CONCENTRATION (OR TOTAL DEPOSITION)
WITH THE FOLLOWING TIME PERIODS:
  HOURLY (YES=1,NO=0)                                               ISW(7) =   0
  2-HOUR (YES=1,NO=0)                                               ISW(8) =   0
  3-HOUR (YES=1,NO=0)                                               ISW(9) =   0
  4-HOUR (YES=1,NO=0)                                              ISW(10) =   0
  6-HOUR (YES=1,NO=0)                                              ISW(11) =   0
  8-HOUR (YES=1,NO=0)                                              ISW(12) =   0
  12-HOUR (YES=1,NO=0)                                             ISW(13) =   0
  24-HOUR (YES=1,NO=0)                                             ISW(14) =   1
PRINT "N"-DAY TABLE(S) (YES=1,NO=0)                                ISW(15) =   1

PRINT THE FOLLOWING TYPES OF TABLES WHOSE TIME PERIODS ARE
SPECIFIED BY ISW(7) THROUGH ISW(14):
  DAILY TABLES (YES=1,NO=0)                                        ISW(16) =   1
  HIGHEST & SECOND HIGHEST TABLES (YES=1,NO=0)                     ISW(17) =   1
  MAXIMUM 50 TABLES (YES=1,NO=0)                                   ISW(18) =   1
METEOROLOGICAL DATA INPUT METHOD (PRE-PROCESSED=1,CARD=2)          ISW(19) =   1
RURAL-URBAN OPTION (RURAL=0,URBAN MODE 1=1,URBAN MODE 2=2)         ISW(20) =   0
WIND PROFILE EXPONENT VALUES (DEFAULTS=1,USER ENTERS=2,3)          ISW(21) =   1
VERTICAL POT  TEMP. GRADIENT VALUES (DEFAULTS=1,USER ENTERS=2,3)   ISW(22) =   1
SCALE EMISSION RATES FOR ALL SOURCES (NO=0,YES)0)                  ISW(23) =   0
PROGRAM CALCULATES FINAL PLUME RISE ONLY (YES=1,NO=2)              ISW(24) =   2
PROGRAM ADJUSTS ALL STACK HEIGHTS FOR DOWNWASH (YES=2,NO=1)        ISW(25) =   1

NUMBER OF INPUT SOURCES                                             NSOURC =  16
NUMBER OF SOURCE GROUPS (=0,ALL SOURCES)                            NGROUP =   5
TIME PERIOD INTERVAL TO BE PRINTED (=0,ALL INTERVALS)                IPERD =   0
NUMBER OF X (RANGE) GRID VALUES                                     NXPNTS =  19
NUMBER OF Y (THETA) GRID VALUES                                     NYPNTS =  19
NUMBER OF DISCRETE RECEPTORS                                        NXWYPT =  64
SOURCE EMISSION RATE UNITS CONVERSION FACTOR                            TK =  .10000+07
ENTRAINMENT COEFFICIENT FOR UNSTABLE ATMOSPHERE                      BETA1 =  .600
ENTRAINMENT COEFFICIENT FOR STABLE ATMOSPHERE                        BETA2 =  .600
HEIGHT ABOVE GROUND AT WHICH WIND SPEED WAS MEASURED                    ZR =  10.00  METERS
LOGICAL UNIT NUMBER OF METEOROLOGICAL DATA                            IMET =   9
DECAY COEFFICIENT FOR PHYSICAL OR CHEMICAL DEPLETION                 DECAY =   .000000
SURFACE STATION NO.                                                    ISS = 14913
YEAR OF SURFACE DATA                                                   ISY = 64
UPPER AIR STATION NO                                                   IUS = 14918
YEAR OF UPPER AIR DATA                                                 IUY = 64
ALLOCATED DATA STORAGE                                               LIMIT = 43500 WORDS
REQUIRED DATA STORAGE FOR THIS PROBLEM RUN                           MIMIT = 18211 WORDS
```

FIGURE C-2. Listing of the input data for the hypothetical potash processing plant concentration run.

```
                 *** -- HYPOTHETICAL POTASH PROCESSING PLANT - CONCENTRATION  -- ***

                                *** METEOROLOGICAL DAYS TO BE PROCESSED ***
                                                 (IF=1)

     0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0
     1 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0
     0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0
     0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 1 0 0 0   0 0 0 0 0 0 0 0 0 0
     0 0 0 0 1 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 1 0   0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0
     0 0 0 0 0 0 0 0 0 0   0 1 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 1 0   0 0 0 0 0 0 0 0 1 0
     0 0 0 0 1 0 0 0 0 0   0 1 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 1 0 0 0   0 0 0 0 0 0 0 0 0 0
     0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0
                           *** NUMBER OF SOURCE NUMBERS REQUIRED TO DEFINE SOURCE GROUPS ***
                                                 (NSOGRP)

         1.    2.    2.    1.    2.
                                *** SOURCE NUMBERS DEFINING SOURCE GROUPS ***
                                                 (IDSOR)

          1.     2.   -11.    12.   -15.    16.     1.   -16.

                           *** UPPER BOUND OF FIRST THROUGH FIFTH WIND SPEED CATEGORIES ***
                                                (METERS/SEC)

                                      1.54,   3.09,   5.14,   8.23,  10.80,

                                     *** WIND PROFILE EXPONENTS ***

   STABILITY                               WIND SPEED CATEGORY
   CATEGORY              1              2              3              4              5              6
       A           .10000+00      .10000+00      .10000+00      .10000+00      .10000+00      .10000+00
       B           .15000+00      .15000+00      .15000+00      .15000+00      .15000+00      .15000+00
       C           .20000+00      .20000+00      .20000+00      .20000+00      .20000+00      .20000+00
       D           .25000+00      .25000+00      .25000+00      .25000+00      .25000+00      .25000+00
       E           .30000+00      .30000+00      .30000+00      .30000+00      .30000+00      .30000+00
       F           .30000+00      .30000+00      .30000+00      .30000+00      .30000+00      .30000+00
```

FIGURE C-2.   (Continued)

```
*** --  HYPOTHETICAL POTASH PROCESSING PLANT - CONCENTRATION  -- ***


                    *** VERTICAL POTENTIAL TEMPERATURE GRADIENTS ***
                                (DEGREES KELVIN PER METER)

       STABILITY                              WIND SPEED CATEGORY
       CATEGORY       1             2             3             4             5             6
          A        .00000        .00000        .00000        .00000        .00000        .00000
          B        .00000        .00000        .00000        .00000        .00000        .00000
          C        .00000        .00000        .00000        .00000        .00000        .00000
          D        .00000        .00000        .00000        .00000        .00000        .00000
          E        .20000-01     .20000-01     .20000-01     .20000-01     .20000-01     .20000-01
          F        .35000-01     .35000-01     .35000-01     .35000-01     .35000-01     .35000-01

                    *** X-COORDINATES OF RECTANGULAR GRID SYSTEM ***
                                        (METERS)

  -3000.0,  -2000.0,  -1500.0,  -1250.0,  -1000.0,   -800.0,   -600.0,   -400.0,   -200.0,       .0,
    200.0,    400.0,    600.0,    800.0,   1000.0,   1250.0,   1500.0,   2000.0,   3000.0,

                    *** Y-COORDINATES OF RECTANGULAR GRID SYSTEM ***
                                        (METERS)

  -3000.0,  -2000.0,  -1500.0,  -1250.0,  -1000.0,   -800.0,   -600.0,   -400.0,   -200.0,       .0,
    200.0,    400.0,    600.0,    800.0,   1000.0,   1250.0,   1500.0,   2000.0,   3000.0,

                    *** RANGE,THETA COORDINATES OF DISCRETE RECEPTORS ***
                                    (METERS,DEGREES)

(    555.0,    317.0), (    620.0,    318.0), (    685.0,    320.0), (    735.0,    322.0), (    800.0,    326.0),
(    860.0,    331.0), (    900.0,    336.0), (    920.0,    341.0), (    940.0,    346.0), (    940.0,    351.0),
(    935.0,    356.0), (    910.0,      1.0), (    950.0,      6.0), (   1015.0,     11.0), (   1055.0,     16.0),
(   1075.0,     21.0), (   1075.0,     26.0), (   1045.0,     31.0), (    995.0,     36.0), (    910.0,     41.0),
(    855.0,     43.0), (    755.0,     45.0), (    620.0,     47.0), (    525.0,     49.0), (    460.0,     51.0),
(    355.0,     56.0), (    355.0,     66.0), (    355.0,     76.0), (    355.0,     86.0), (    350.0,     96.0),
(    345.0,    106.0), (    335.0,    116.0), (    325.0,    126.0), (    380.0,    136.0), (    420.0,    141.0),
(    450.0,    146.0), (    480.0,    151.0), (    505.0,    156.0), (    535.0,    161.0), (    575.0,    166.0),
(    620.0,    171.0), (    665.0,    176.0), (    705.0,    181.0), (    730.0,    186.0), (    745.0,    191.0),
(    755.0,    196.0), (    755.0,    201.0), (    745.0,    206.0), (    730.0,    211.0), (    705.0,    216.0),
(    690.0,    221.0), (    690.0,    226.0), (    690.0,    231.0), (    680.0,    236.0), (    665.0,    241.0),
(    645.0,    246.0), (    615.0,    251.0), (    575.0,    256.0), (    530.0,    261.0), (    475.0,    266.0),
(    410.0,    271.0), (    365.0,    276.0), (    365.0,    286.0), (    410.0,    296.0), (
```

FIGURE C-2.   (Continued)

```
                         *** --  HYPOTHETICAL POTASH PROCESSING PLANT - CONCENTRATION  -- ***

                                            *** SOURCE DATA ***

                   EMISSION RATE                                                TEMP.   EXIT VEL.
                      TYPE=0,1                                                 TYPE=0    TYPE=0
       T W          (GRAMS/SEC)                                               (DEG.K)   (M/SEC)               BLDG.    BLDG.    BLDG.
       Y A NUMBER     TYPE=2                            BASE                  VERT.DIM  HORZ.DIM DIAMETER   HEIGHT   LENGTH    WIDTH
SOURCE P K  PART.   (GRAMS/SEC)      X         Y        ELEV.    HEIGHT    TYPE=1   TYPE=1,2   TYPE=0   TYPE=0   TYPE=0   TYPE=0
NUMBER E E  CATS. *PER METER**2 (METERS) (METERS)  (METERS)  (METERS)  (METERS)  (METERS)  (METERS) (METERS) (METERS) (METERS)
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

     1 2 0    6      .10000+00   -13.3     -13.3       .0    10.00      .00    26.60       .00      .00      .00      .00
     2 1 0    6      .13000+00    20.0        .0       .0      .90     1.00     4.70       .00      .00      .00      .00
     3 1 0    6      .13000+00    30.0        .0       .0     2.60     1.00     4.70       .00      .00      .00      .00
     4 1 0    6      .13000+00    40.0        .0       .0     4.30     1.00     4.70       .00      .00      .00      .00
     5 1 0    6      .13000+00    49.0        .0       .0     6.10     1.00     4.70       .00      .00      .00      .00
     6 1 0    6      .13000+00    59.0        .0       .0     7.80     1.00     4.70       .00      .00      .00      .00
     7 1 0    6      .13000+00    69.0        .0       .0     9.60     1.00     4.70       .00      .00      .00      .00
     8 1 0    6      .13000+00    79.0        .0       .0    11.30     1.00     4.70       .00      .00      .00      .00
     9 1 0    6      .13000+00    89.0        .0       .0    13.00     1.00     4.70       .00      .00      .00      .00
    10 1 0    6      .13000+00    99.0        .0       .0    14.80     1.00     4.70       .00      .00      .00      .00
    11 1 0    6      .13000+00   109.0        .0       .0    16.50     1.00     4.70       .00      .00      .00      .00
    12 1 0    0      .26300+01   121.0        .0       .0    22.50    11.60    10.80       .00      .00      .00      .00
    13 1 0    0      .26300+01   144.0        .0       .0    22.50    11.60    10.80       .00      .00      .00      .00
    14 1 0    0      .26300+01   167.0        .0       .0    22.50    11.60    10.80       .00      .00      .00      .00
    15 1 0    0      .26300+01   190.0        .0       .0    22.50    11.60    10.80       .00      .00      .00      .00
    16 0 0    0      .50000+01   201.0        .0       .0    50.00   340.00     0.00      1.00    25.00    90.00    50.00
```

FIGURE C-2.   (Continued)

```
*** --  HYPOTHETICAL POTASH PROCESSING PLANT - CONCENTRATION  -- ***

                    *** SOURCE PARTICULATE DATA ***

*** SOURCE NUMBER =     1 ***

MASS FRACTION =
 .10000,  .40000,  .28000,  .12000,  .06000,  .04000,

SETTLING VELOCITY(METERS/SEC) =
   .0010,   .0070,   .0190,   .0370,   .0610,   .0990,

SURFACE REFLECTION COEFFICIENT =
1.00000,  .82000,  .72000,  .65000,  .59000,  .50000,

*** SOURCE NUMBER =     2 ***

MASS FRACTION =
 .10000,  .40000,  .28000,  .12000,  .06000,  .04000,

SETTLING VELOCITY(METERS/SEC) =
   .0010,   .0070,   .0190,   .0370,   .0610,   .0990,

SURFACE REFLECTION COEFFICIENT =
1.00000,  .82000,  .72000,  .65000,  .59000,  .50000,

*** SOURCE NUMBER =     3 ***

MASS FRACTION =
 .10000,  .40000,  .28000,  .12000,  .06000,  .04000,

SETTLING VELOCITY(METERS/SEC) =
   .0010,   .0070,   .0190,   .0370,   .0610,   .0990,

SURFACE REFLECTION COEFFICIENT =
1.00000,  .82000,  .72000,  .65000,  .59000,  .50000,
```

FIGURE C-2. (Continued)

```
*** --  HYPOTHETICAL POTASH PROCESSING PLANT - CONCENTRATION  -- ***

                    *** SOURCE PARTICULATE DATA ***


*** SOURCE NUMBER =      4 ***

MASS FRACTION =
 .10000, .40000, .28000, .12000, .06000, .04000,

SETTLING VELOCITY(METERS/SEC) =
  .0010,  .0070,  .0190,  .0370,  .0610,  .0990,

SURFACE REFLECTION COEFFICIENT =
1.00000, .82000, .72000, .65000, .59000, .50000,

*** SOURCE NUMBER =      5 ***

MASS FRACTION =
 .10000, .40000, .28000, .12000, .06000, .04000,

SETTLING VELOCITY(METERS/SEC) =
  .0010,  .0070,  .0190,  .0370,  .0610,  .0990,

SURFACE REFLECTION COEFFICIENT =
1.00000, .82000, .72000, .65000, .59000, .50000,

*** SOURCE NUMBER =      6 ***

MASS FRACTION =
  10000,  40000, .28000, .12000, .06000, .04000,

SETTLING VELOCITY(METERS/SEC) =
  .0010,  .0070,  .0190,  .0370,  .0610,   0990,

SURFACE REFLECTION COEFFICIENT =
1.00000, .82000, .72000, .65000, .59000, .50000,
```

FIGURE C-2.   (Continued)

```
*** -- HYPOTHETICAL POTASH PROCESSING PLANT - CONCENTRATION  -- ***

                         *** SOURCE PARTICULATE DATA ***

*** SOURCE NUMBER =     7 ***

MASS FRACTION =
 .10000, .40000, .28000, .12000, .06000, .04000,

SETTLING VELOCITY(METERS/SEC) =
   .0010,  .0070,  .0190,  .0370,  .0610,  .0990,

SURFACE REFLECTION COEFFICIENT =
1.00000, .82000, .72000, .65000, .59000, .50000,

*** SOURCE NUMBER =     8 ***

MASS FRACTION =
 .10000, .40000, .28000, .12000, .06000, .04000,

SETTLING VELOCITY(METERS/SEC) =
   .0010,  .0070,  .0190,  .0370,  .0610,  .0990,

SURFACE REFLECTION COEFFICIENT =
1.00000, .82000, .72000, .65000, .59000, .50000,

*** SOURCE NUMBER =     9 ***

MASS FRACTION =
 .10000, .40000, .28000, .12000, .06000, .04000,

SETTLING VELOCITY(METERS/SEC) =
   .0010,  .0070,  .0190,  .0370,  .0610,  .0990,

SURFACE REFLECTION COEFFICIENT =
1.00000, .82000, .72000, .65000, .59000, .50000,
```

FIGURE C-2.   (Continued)

```
                  *** --  HYPOTHETICAL POTASH PROCESSING PLANT - CONCENTRATION  -- ***

                                  *** SOURCE PARTICULATE DATA ***

*** SOURCE NUMBER =    10 ***

MASS FRACTION =
 .10000, .40000, .28000, .12000, .06000, .04000,

SETTLING VELOCITY(METERS/SEC) =
  .0010,  .0070,  .0190,  .0370,  .0610,  .0990,

SURFACE REFLECTION COEFFICIENT =
1.00000, .82000, .72000, .65000, .59000, .50000,

*** SOURCE NUMBER =    11 ***

MASS FRACTION =
 .10000, .40000, .28000, .12000, .06000, .04000,

SETTLING VELOCITY(METERS/SEC) =
  .0010,  .0070,  .0190,  .0370,  .0610,  .0990,

SURFACE REFLECTION COEFFICIENT =
1.00000, .82000, .72000, .65000, .59000, .50000,
```

FIGURE C-2.   (Continued)

```
*** --  HYPOTHETICAL POTASH PROCESSING PLANT - CONCENTRATION  -- ***

* SOURCE EMISSION RATE SCALARS WHICH VARY FOR EACH HOUR OF THE DAY *

    HOUR   SCALAR      HOUR   SCALAR      HOUR   SCALAR      HOUR   SCALAR      HOUR   SCALAR      HOUR   SCALAR
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

SOURCE NO. =     1
       1   .10000+01      2   .10000+01      3   .10000+01      4   .10000+01      5   .10000+01      6   .10000+01
       7   .10000+01      8   .50000+01      9   .50000+01     10   .50000+01     11   .50000+01     12   .50000+01
      13   .50000+01     14   .50000+01     15   .50000+01     16   .10000+01     17   .10000+01     18   .10000+01
      19   .10000+01     20   .10000+01     21   .10000+01     22   .10000+01     23   .10000+01     24   .10000+01
```

FIGURE C-2.   (Continued)

```
                                                                                   MET. DATA
                                                                                   DAY  51
            *** --  HYPOTHETICAL POTASH PROCESSING PLANT - CONCENTRATION  -- ***

                         * METEOROLOGICAL DATA FOR DAY  51 *

                      RANDOM
             FLOW      FLOW      WIND      MIXING                INPUT      ADJUSTED
            VECTOR    VECTOR     SPEED     HEIGHT      TEMP.   STABILITY   STABILITY
  HOUR   (DEGREES) (DEGREES)     (MPS)   (METERS)   (DEG. K)   CATEGORY    CATEGORY
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

    1       160.0     158.0      5.14      761.2     261.5        4            4
    2       160.0     163.0      3.60      764.2     260.4        5            5
    3       150.0     154.0      3.60      767.2     259.8        5            5
    4       150.0     151.0      4.63      770.2     258.7        5            5
    5       150.0     148.0      5.66      773.1     258.1        4            4
    6       140.0     143.0      6.17      776.1     257.6        4            4
    7       150.0     152.0      6.17      779.1     257.0        4            4
    8       150.0     155.0      5.66      782.1     257.0        4            4
    9       160.0     162.0      4.63      785.1     256.5        3            3
   10       160.0     157.0      5.14      788.1     258.7        4            4
   11       170.0     173.0      5.14      791.0     260.9        4            4
   12       160.0     162.0      6.17      794.0     262.6        4            4
   13       150.0     148.0      4.63      797.0     263.7        3            3
   14       160.0     160.0      6.69      800.0     264.8        4            4
   15       150.0     154.0      6.17      800.0     264.8        4            4
   16       150.0     146.0      6.69      800.0     265.4        4            4
   17       160.0     158.0      6.17      800.0     264.8        4            4
   18       160.0     157.0      4.12      802.9     263.1        5            5
   19       160.0     165.0      3.60      809.5     262.0        5            5
   20       160.0     161.0      4.63      816.1     260.9        5            5
   21       160.0     165.0      5.14      822.7     259.8        5            5
   22       160.0     156.0      3.60      829.3     259.3        5            5
   23       150.0     146.0      4.12      835.9     258.7        5            5
   24       160.0     160.0      5.66      842.5     258.1        4            4
```

FIGURE C-3.   Listing of one day of hourly meteorological data used for the hypothetical potash processing plant concentration run.

```
*** --  HYPOTHETICAL POTASH PROCESSING PLANT - CONCENTRATION  -- ***

* SOURCE-RECEPTOR COMBINATIONS LESS THAN 100 METERS OR THREE BUILDING
  HEIGHTS IN DISTANCE.  NO AVERAGE CONCENTRATION    IS CALCULATED *

                 - - RECEPTOR LOCATION - -
                    X         Y (METERS)           DISTANCE
SOURCE          OR RANGE   OR DIRECTION            BETWEEN
NUMBER          (METERS)    (DEGREES)              (METERS)
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

    1                 .0            .0              -15.01
    2                 .0            .0                9.90
    3                 .0            .0               19.90
    4                 .0            .0               29.90
    5                 .0            .0               38.90
    6                 .0            .0               48.90
    7                 .0            .0               58.90
    8                 .0            .0               68.90
    9                 .0            .0               78.90
   10                 .0            .0               88.90
   10              200.0            .0               90.90
   11                 .0            .0               98.90
   11              200.0            .0               80.90
   12                 .0            .0               97.78
   12              200.0            .0               55.78
   13              200.0            .0               32.78
   14              200.0            .0                9.78
   15              200.0            .0              -13.22
   16              200.0            .0                1.00
```

FIGURE C-4. Listing of the diagnostic message table produced by the hypothetical potash processing plant concentration run.

```
                                                                                                    DAILY:  51
                                                                                                    24-HR/PD 1
                     *** --  HYPOTHETICAL POTASH PROCESSING PLANT - CONCENTRATION  -- ***          SGROUPS  3

                     * DAILY 24-HOUR AVERAGE CONCENTRATION (MICROGRAMS/CUBIC METER)      *
                                  * ENDING WITH HOUR 24 FOR DAY  51 *
                                  * FROM SOURCES:        12,   -15,
                                      * FOR THE RECEPTOR GRID *

                * MAXIMUM VALUE EQUALS    205.91974 AND OCCURRED AT (      200.0,    -200.0) *

  Y-AXIS    /                                                X-AXIS (METERS)
 (METERS)   /      -3000.0     -2000.0     -1500.0     -1250.0     -1000.0      -800.0      -600.0      -400.0      -200.0
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

   3000.0 /         .00000      .00000      .00000      .00000      .00000      .00000      .00000      .00000      .00000
   2000.0 /         .00000      .00000      .00000      .00000      .00000      .00000      .00000      .00000      .00000
   1500.0 /         .00000      .00000      .00000      .00000      .00000      .00000      .00000      .00000      .00000
   1250.0 /         .00000      .00000      .00000      .00000      .00000      .00000      .00000      .00000      .00000
   1000.0 /         .00000      .00000      .00000      .00000      .00000      .00000      .00000      .00000      .00000
    800.0 /         .00000      .00000      .00000      .00000      .00000      .00000      .00000      .00000      .00000
    600.0 /         .00000      .00000      .00000      .00000      .00000      .00000      .00000      .00000      .00000
    400.0 /         .00000      .00000      .00000      .00000      .00000      .00000      .00000      .00000      .00000
    200.0 /         .00000      .00000      .00000      .00000      .00000      .00000      .00000      .00000      .00000
       .0 /         .00000      .00000      .00000      .00000      .00000      .00000      .00000      .00000      .00000
   -200.0 /         .00000      .00000      .00000      .00000      .00000      .00000      .00000      .00000      .00000
   -400.0 /         .00000      .00000      .00000      .00000      .00000      .00000      .00000      .00000      .00000
   -600.0 /         .00000      .00000      .00000      .00000      .00000      .00000      .00000      .00000      .00000
   -800.0 /         .00000      .00000      .00000      .00000      .00000      .00000      .00000      .00000      .00000
  -1000.0 /         .00000      .00000      .00000      .00000      .00000      .00000      .00000      .00000      .00000
  -1250.0 /         .00000      .00000      .00000      .00000      .00000      .00000      .00000      .00000      .00000
  -1500.0 /         .00000      .00000      .00000      .00000      .00000      .00000      .00000      .00000      .00001
  -2000.0 /         .00000      .00000      .00000      .00000      .00000      .00000      .00000      .00000      .00016
  -3000.0 /         .00000      .00000      .00000      .00000      .00000      .00000      .00000      .00001      .00133
```

FIGURE C-5. Listing of the table of 24-hour average concentration values computed on day 51 from Sources 12 to 15 by the hypothetical potash processing plant concentration run.

```
                                                                                         DAILY:  51
                                                                                         24-HR/PD 1
                                                                                         SGROUP#  3
                     *** --  HYPOTHETICAL POTASH PROCESSING PLANT - CONCENTRATION  -- ***

                     * DAILY 24-HOUR AVERAGE CONCENTRATION (MICROGRAMS/CUBIC METER)     *
                                  * ENDING WITH HOUR 24 FOR DAY  51 *
                                  * FROM SOURCES:        12.   -15.
                                       * FOR THE RECEPTOR GRID *

                  * MAXIMUM VALUE EQUALS    205.91974 AND OCCURRED AT (     200.0,    -200.0) *

  Y-AXIS   /                                         X-AXIS (METERS)
 (METERS)  /          .0        200.0       400.0       600.0       800.0      1000.0      1250.0      1500.0      2000.0
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

   3000.0 /       .00000      .00000      .00000      .00000      .00000      .00000      .00000      .00000      .00000
   2000.0 /       .00000      .00000      .00000      .00000      .00000      .00000      .00000      .00000      .00000
   1500.0 /       .00000      .00000      .00000      .00000      .00000      .00000      .00000      .00000      .00000
   1250.0 /       .00000      .00000      .00000      .00000      .00000      .00000      .00000      .00000      .00000
   1000.0 /       .00000      .00000      .00000      .00000      .00000      .00000      .00000      .00000      .00000
    800.0 /       .00000      .00000      .00000      .00000      .00000      .00000      .00000      .00000      .00000
    600.0 /       .00000      .00000      .00000      .00000      .00000      .00000      .00000      .00000      .00000
    400.0 /       .00000      .00000      .00000      .00000      .00000      .00000      .00000      .00000      .00000
    200.0 /       .00000      .00000      .00000      .00000      .00000      .00000      .00000      .00000      .00000
       .0 /       .00000      .00000      .00000      .00000      .00000      .00000      .00000      .00000      .00000
   -200.0 /       .00000   205.91974     4.73236      .00008      .00000      .00000      .00000      .00000      .00000
   -400.0 /       .00016    39.61426   125.83667     1.86694      .00174      .00000      .00000      .00000      .00000
   -600.0 /       .00207    12.47965   143.40306    39.36984     1.03534      .00552      .00001      .00000      .00000
   -800.0 /       .00719     6.62089    89.20368    71.92775    15.99408      .65719      .00321      .00002      .00000
  -1000.0 /       .01426     4.20003    46.58354    81.25763    35.18431     7.47949      .19736      .00201      .00000
  -1250.0 /       .02333     2.66060    18.46155    60.00740    49.16711    22.64871     3.46626      .15321      .00007
  -1500.0 /       .03083     1.81599     8.23092    40.99999    49.97206    29.62180    12.84532     1.87130      .00433
  -2000.0 /       .03957      .97937     3.31048    13.90630    38.64077    34.20554    21.43504    12.10795      .73466
  -3000.0 /       .04127      .40632     1.34338     2.12759     6.60176    15.35725    18.09126    19.29385     8.21911
```

FIGURE C-5. (Continued)

```
                                                                                                    DAILY:  51
                                                                                                    24-HR/PD 1
                                                                                                    SGROUP#  3
                                    *** --  HYPOTHETICAL POTASH PROCESSING PLANT - CONCENTRATION  -- ***

                                    * DAILY 24-HOUR AVERAGE CONCENTRATION (MICROGRAMS/CUBIC METER)     *
                                                   * ENDING WITH HOUR 24 FOR DAY  51 *
                                                    * FROM SOURCES:       12,   -15,
                                                        * FOR THE RECEPTOR GRID *

                                 * MAXIMUM VALUE EQUALS    205.91974 AND OCCURRED AT (     200.0,    -200.0) *

  Y-AXIS   /                                                X-AXIS (METERS)
 (METERS)  /       3000.0
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

    3000.0 /       .00000
    2000.0 /       .00000
    1500.0 /       .00000
    1250.0 /       .00000
    1000.0 /       .00000
     800.0 /       .00000
     600.0 /       .00000
     400.0 /       .00000
     200.0 /       .00000
        .0 /       .00000
    -200.0 /       .00000
    -400.0 /       .00000
    -600.0 /       .00000
    -800.0 /       .00000
   -1000.0 /       .00000
   -1250.0 /       .00000
   -1500.0 /       .00000
   -2000.0 /       .00002
   -3000.0 /       .21505
```

FIGURE C-5. (Continued)

```
                                                                                                          DAILY:  51
                                                                                                          24-HR/PD 1
                             *** --  HYPOTHETICAL POTASH PROCESSING PLANT - CONCENTRATION  -- ***        SGROUP# 3

                             * DAILY 24-HOUR AVERAGE CONCENTRATION (MICROGRAMS/CUBIC METER)     *
                                          * ENDING WITH HOUR 24 FOR DAY  51 *
                                           * FROM SOURCES:        12,   -15,
                                          * FOR THE DISCRETE RECEPTOR POINTS *

   - RNG -     - DIR -      CON.             - RNG -     - DIR -      CON.             - RNG -     - DIR -      CON.
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

     555.0       317.0      .00000             620.0       318.0      .00000             685.0       320.0      .00000
     735.0       322.0      .00000             800.0       326.0      .00000             860.0       331.0      .00000
     900.0       336.0      .00000             920.0       341.0      .00000             940.0       346.0      .00000
     940.0       351.0      .00000             935.0       356.0      .00000             910.0         1.0      .00000
     950.0         6.0      .00000            1015.0        11.0      .00000            1055.0        16.0      .00000
    1075.0        21.0      .00000            1075.0        26.0      .00000            1045.0        31.0      .00000
     995.0        36.0      .00000             910.0        41.0      .00000             855.0        43.0      .00000
     755.0        45.0      .00000             620.0        47.0      .00000             525.0        49.0      .00000
     460.0        51.0      .00000             355.0        56.0      .00000             355.0        66.0      .00000
     355.0        76.0      .00000             355.0        86.0      .00000             350.0        96.0      .00006
     345.0       106.0      .74947             335.0       116.0    61.66626             325.0       126.0   270.49908
     380.0       136.0   261.61783             420.0       141.0   215.76077             450.0       146.0   146.44760
     480.0       151.0    77.02658             505.0       156.0    29.76986             535.0       161.0    10.57306
     575.0       166.0     3.52426             620.0       171.0      .71228             665.0       176.0      .06247
     705.0       181.0      .00185             730.0       186.0      .00001             745.0       191.0      .00000
     755.0       196.0      .00000             755.0       201.0      .00000             745.0       206.0      .00000
     730.0       211.0      .00000             705.0       216.0      .00000             690.0       221.0      .00000
     690.0       226.0      .00000             690.0       231.0      .00000             680.0       236.0      .00000
     665.0       241.0      .00000             645.0       246.0      .00000             615.0       251.0      .00000
     575.0       256.0      .00000             530.0       261.0      .00000             475.0       266.0      .00000
     410.0       271.0      .00000             365.0       276.0      .00000             365.0       286.0      .00000
     410.0       296.0      .00000
```

FIGURE C-5. (Continued)

```
                                                                                                   "N"-DAY
                                                                                                   10 DAYS
                      *** --  HYPOTHETICAL POTASH PROCESSING PLANT - CONCENTRATION  -- ***        $GROUP$  2

                         *  10-DAY AVERAGE CONCENTRATION (MICROGRAMS/CUBIC METER)     *

                                      * FROM SOURCES:        2.   -11.
                                        * FOR THE RECEPTOR GRID *

                   * MAXIMUM VALUE EQUALS     19.55864 AND OCCURRED AT (     200.0,     200.0) *

  Y-AXIS   /                                            X-AXIS (METERS)
 (METERS)  /     -3000.0     -2000.0     -1500.0     -1250.0     -1000.0      -800.0      -600.0      -400.0      -200.0
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

   3000.0 /       .00379      .13594      .08312      .01310      .00069      .00004      .00000      .00000      .00000
   2000.0 /       .50355      .01042      .08744      .30058      .18698      .02593      .00087      .00001      .00000
   1500.0 /       .42209      .51490      .02203      .02690      .35072      .42864      .06255      .00088      .00000
   1250.0 /       .50142     1.10515      .27417      .03600      .06412      .53477      .39810      .01316      .00003
   1000.0 /       .65580      .81570     1.60911      .68328      .06706      .08507      .85516      .22028      .00065
    800.0 /       .65771     1.06125     1.54827     2.44303     1.11891      .12821      .24350     1.11938      .01404
    600.0 /       .72732     1.25936     1.69907     1.72136     3.67227     2.93072      .30923      .90824      .40827
    400.0 /       .61007     1.39884     1.98263     2.63202     3.26572     3.56341     7.26782     1.16263     3.12628
    200.0 /       .28045      .77120     1.80568     2.88136     4.13897     5.34441     8.15958    11.19211     8.97102
       .0 /       .20279      .39000      .61642      .82080     1.15974     1.65148     2.62001     4.85777    12.49825
   -200.0 /       .12277      .15415      .14332      .11660      .07122      .03092      .00546      .00012      .00000
   -400.0 /       .04033      .01506      .00294      .00058      .00004      .00000      .00000      .00000      .00000
   -600.0 /       .00604      .00028      .00001      .00000      .00000      .00000      .00000      .00000      .00174
   -800.0 /       .00039      .00000      .00000      .00000      .00000      .00000      .00000      .00000      .01884
  -1000.0 /       .00001      .00000      .00000      .00000      .00000      .00000      .00000      .00005      .05645
  -1250.0 /       .00000      .00000      .00000      .00000      .00000      .00000      .00000      .00115      .11626
  -1500.0 /       .00000      .00000      .00000      .00000      .00000      .00000      .00002      .00648      .17534
  -2000.0 /       .00000      .00000      .00000      .00000      .00000      .00001      .00154      .03177      .25791
  -3000.0 /       .00000      .00000      .00000      .00000      .00023      .00355      .02272      .08682      .27111
```

FIGURE C-6. Listing of the table of the 10-day average concentration values computed from Sources 2 to 11 by the hypothetical potash processing plant concentration run.

```
                                                                                                    *N*-DAY
                                                                                                    10 DAYS
                          *** --  HYPOTHETICAL POTASH PROCESSING PLANT - CONCENTRATION  -- ***         &GROUP#  2

                        *  10-DAY AVERAGE CONCENTRATION (MICROGRAMS/CUBIC METER)     *

                                    * FROM SOURCES:        2,   -11,
                                     * FOR THE RECEPTOR GRID *

                      * MAXIMUM VALUE EQUALS     19.55864 AND OCCURRED AT (      200.0,     200.0) *

 Y-AXIS   /                                                  X-AXIS (METERS)
(METERS)  /             .0         200.0         400.0         600.0         800.0        1000.0        1250.0        1500.0        2000.0
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

  3000.0 /          .00021        .00917        .08403        .29060        .31158        .14985        .21665        .24463        .19389
  2000.0 /          .00040        .04783        .50843        .50412        .33497        .47071        .37844        .45311        .71405
  1500.0 /          .00060        .17286        .95553        .50400        .71404        .60200       1.07729       1.15517        .68717
  1250.0 /          .00076        .40580       1.03341        .95639        .82038       1.17887       1.57224       1.93075        .78791
  1000.0 /          .00099       1.02864        .98524       1.25437       1.60237       2.29016       2.31409       1.22928        .45536
   800.0 /          .00128       2.06478       1.84034       1.80974       3.30140       3.54549       1.69871       1.05281        .37186
   600.0 /          .00176       3.37712       2.81676       5.20137       4.28234       2.52872       1.03737        .62806        .15742
   400.0 /          .00402       4.96265       9.15645       5.85779       2.73591       1.30902        .39109        .57876        .30468
   200.0 /          .71724      19.55864       9.47573       1.96576       1.81070       1.21092        .76032        .67270        .26480
      .0 /          .00000       2.23411        .89796        .50499        .32276        .22445        .15854        .11880        .07492
  -200.0 /         4.88986       6.00057       6.53752       2.32495        .64024        .18242        .04340        .01265        .00350
  -400.0 /         4.07129       9.94799       1.29573       2.17407       2.55888       1.27223        .40513        .21711        .04122
  -600.0 /         3.17418       6.50573       2.32979        .55008       1.66965       1.06957       1.35741        .57672        .17589
  -800.0 /         2.47149       4.48760       3.16556        .82563        .31914       1.06126        .52405        .82813        .33462
 -1000.0 /         1.95317       3.36499       2.45173       1.14723        .42571        .21629        .78602        .30004        .62977
 -1250.0 /         1.50975       2.22100       2.02463       1.61413        .56476        .27515        .14752        .47657        .31534
 -1500.0 /         1.19636       1.43846       1.39329       1.18727        .84438        .35568        .15793        .10812        .32429
 -2000.0 /          .80511        .71417       1.09354        .97663        .72593        .64182        .24998        .15264        .06628
 -3000.0 /          .44825        .33716        .57389        .52389        .46296        .45793        .39972        .30418        .10650
```

FIGURE C-6. (Continued)

```
                                                                                              "H"-DAY
                                                                                               10 DAYS
                                    *** --  HYPOTHETICAL POTASH PROCESSING PLANT - CONCENTRATION  -- ***      SGROUP#  2

                                      *  10-DAY AVERAGE CONCENTRATION (MICROGRAMS/CUBIC METER)     *

                                                * FROM SOURCES:        2,   -11,
                                                  * FOR THE RECEPTOR GRID *

                                * MAXIMUM VALUE EQUALS     19.55864 AND OCCURRED AT (      200.0,      200.0) *

 Y-AXIS   /                                                 X-AXIS (METERS)
(METERS)  /        3000.0
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

   3000.0 /         .36482
   2000.0 /         .39912
   1500.0 /         .21502
   1250.0 /         .19483
   1000.0 /         .08015
    800.0 /         .19504
    600.0 /         .13382
    400.0 /         .21862
    200.0 /         .05774
       .0 /         .03962
   -200.0 /         .00487
   -400.0 /         .00221
   -600.0 /         .01790
   -800.0 /         .05999
  -1000.0 /         .10807
  -1250.0 /         .18160
  -1500.0 /         .33362
  -2000.0 /         .09057
  -3000.0 /         .03319
```

FIGURE C-6. (Continued)

```
                                                                                          "H"-DAY
                                                                                           10 DAYS
                                                                                          SGROUP#  2
                           *** --  HYPOTHETICAL POTASH PROCESSING PLANT - CONCENTRATION  -- ***

                            *  10-DAY AVERAGE CONCENTRATION (MICROGRAMS/CUBIC METER)     *

                                          * FROM SOURCES:         2,    -11,
                                        * FOR THE DISCRETE RECEPTOR POINTS *

   - RNG -     - DIR -     CON.                - RNG -     - DIR -     CON.                - RNG -     - DIR -     CON.
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

     555.0       317.0       .64430              620.0       318.0       .32151              685.0       320.0       .17095
     735.0       322.0       .22230              800.0       326.0       .76855              860.0       331.0      1.36164
     900.0       336.0       .70925              920.0       341.0       .11470              940.0       346.0       .00646
     940.0       351.0       .00022              935.0       356.0       .00001              910.0         1.0       .00291
     950.0         6.0       .10125             1015.0        11.0       .94628             1055.0        16.0      1.71317
    1075.0        21.0      1.01459             1075.0        26.0      1.38512             1045.0        31.0      1.50867
     995.0        36.0      1.71214              910.0        41.0      3.52849              855.0        43.0      4.66738
     755.0        45.0      6.19663              620.0        47.0      9.21869              525.0        49.0     13.27804
     460.0        51.0     17.12016              355.0        56.0     20.77974              355.0        66.0     10.67538
     355.0        76.0      4.82090              355.0        86.0      2.93978              350.0        96.0       .45671
     345.0       106.0      5.86115              335.0       116.0      9.52768              325.0       126.0      6.57453
     380.0       136.0      3.38442              420.0       141.0      4.46995              450.0       146.0      6.35272
     480.0       151.0      8.18763              505.0       156.0      8.51923              535.0       161.0      8.48276
     575.0       166.0      7.71552              620.0       171.0      5.87146              665.0       176.0      4.33245
     705.0       181.0      2.33030              730.0       186.0       .59311              745.0       191.0       .08491
     755.0       196.0       .00687              755.0       201.0       .00018              745.0       206.0       .00000
     730.0       211.0       .00000              705.0       216.0       .00000              690.0       221.0       .00000
     690.0       226.0       .00000              690.0       231.0       .00000              680.0       236.0       .00000
     665.0       241.0       .00000              645.0       246.0       .00009              615.0       251.0       .00423
     575.0       256.0       .08683              530.0       261.0       .67749              475.0       266.0      2.36500
     410.0       271.0      5.16094              365.0       276.0     11.20536              365.0       286.0     10.16617
     410.0       296.0     12.96254
```

FIGURE C-6. (Continued)

```
                                                                                                HIGH
                                                                                                24-HR
                                                                                                SGROUP# 1
              *** -- HYPOTHETICAL POTASH PROCESSING PLANT - CONCENTRATION -- ***

              * HIGHEST 24-HOUR AVERAGE CONCENTRATION (MICROGRAMS/CUBIC METER)     *
                               * FROM SOURCES:        1,
                                 * FOR THE RECEPTOR GRID *

            * MAXIMUM VALUE EQUALS  29257.33984 AND OCCURRED AT (        .0,    -200.0) *

  Y-AXIS   /                                         X-AXIS (METERS)
 (METERS)  /         -3000.0                -2000.0               -1500.0                -1250.0                -1000.0
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

   3000.0 /       7.01088 (187,  1)     78.74459 (305,  1)     18.80492 (305,  1)      2.66758 (205,  1)       .22506 (187,  1)
   2000.0 /     262.92981 (187,  1)     16.39869 (187,  1)     73.82428 (305,  1)    153.63390 (305,  1)     38.32646 (305,  1)
   1500.0 /     286.99170 (305,  1)    240.66968 (187,  1)     29.79066 (187,  1)     31.76500 (187,  1)    236.79732 (305,  1)
   1250.0 /     326.64682 (305,  1)    455.56999 (187,  1)    134.89873 (187,  1)     43.37550 (187,  1)     70.12573 (305,  1)
   1000.0 /     373.36642 (305,  1)    564.73594 (305,  1)    802.14337 (187,  1)    283.60898 (187,  1)     68.49780 (187,  1)
    800.0 /     393.97098 (262,  1)    675.95557 (305,  1)   1070.54025 (205,  1)   1044.73756 (187,  1)    425.15841 (187,  1)
    600.0 /     385.86480 (262,  1)    618.58744 (305,  1)   1082.33798 (305,  1)   1233.12947 (305,  1)   1861.97388 (205,  1)
    400.0 /     269.97475 (262,  1)    746.60553 (262,  1)   1190.02315 (262,  1)   1454.61662 (305,  1)   2083.11252 (305,  1)
    200.0 /     225.80037 (262,  1)    468.32584 (262,  1)    861.27760 (262,  1)   1330.66579 (262,  1)   2264.69687 (262,  1)
        0 /     247.35113 (262,  1)    477.78599 (262,  1)    759.00874 (262,  1)   1015.25744 (262,  1)   1444.61826 (262,  1)
   -200.0 /     194.09293 (262,  1)    244.51450 (262,  1)    209.60483 (262,  1)    149.95262 (262,  1)     67.56431 (262,  1)
   -400.0 /      61.45128 (262,  1)     16.28438 (262,  1)      1.66652 (262,  1)       .15093 (262,  1)       .00295 (187,  1)
   -600.0 /       6.82830 (262,  1)       .12364 (262,  1)       .00073 (187,  1)       .00003 (187,  1)       .00000 (187,  1)
   -800.0 /        .26891 (262,  1)       .00026 (187,  1)       .00000 (187,  1)       .00000 (187,  1)       .00000 (187,  1)
  -1000.0 /        .00396 (262,  1)       .00000 (187,  1)       .00000 (187,  1)       .00000 (187,  1)       .00000 (337,  1)
  -1250.0 /        .00002 (187,  1)       .00000 (187,  1)       .00000 (187,  1)       .00000 (337,  1)       .00000 (337,  1)
  -1500.0 /        .00000 (187,  1)       .00000 (187,  1)       .00000 (337,  1)       .00000 (337,  1)       .00000 (337,  1)
  -2000.0 /        .00000 (187,  1)       .00000 (337,  1)       .00000 (337,  1)       .00000 (337,  1)       .00021 (337,  1)
  -3000.0 /        .00000 (337,  1)       .00000 (337,  1)       .00005 (337,  1)       .01587 (337,  1)      1.52175 (337,  1)
```

FIGURE C-7. Listing of the table of the highest average concentration values computed at each receptor from Source 1 by the hypothetical potash processing plant concentration run.

```
                                                                                                HIGH
                                                                                                24-HR
                                                                                                SGROUP# 1
                        *** --  HYPOTHETICAL POTASH PROCESSING PLANT - CONCENTRATION  -- ***

                     * HIGHEST 24-HOUR AVERAGE CONCENTRATION (MICROGRAMS/CUBIC METER)     *
                                         * FROM SOURCES:        1.
                                            * FOR THE RECEPTOR GRID *

                  * MAXIMUM VALUE EQUALS  29257.33984 AND OCCURRED AT (          .0,    -200.0) *

  Y-AXIS   /                                               X-AXIS (METERS)
 (METERS)  /           -800.0              -600.0              -400.0              -200.0                 .0
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

   3000.0 /       .02187 (187. 1)      .00103 (187. 1)      .00002 (187. 1)      .00140 (289. 1)      .39430 (289. 1)
   2000.0 /      3.64513 (205. 1)      .23969 (187. 1)      .00440 (187. 1)      .00018 (289. 1)     1.03276 (289. 1)
   1500.0 /    118.39290 (305. 1)     6.56493 (205. 1)      .17455 (187. 1)      .00037 (187. 1)     2.02372 (289. 1)
   1250.0 /    329.68170 (305. 1)    53.75400 (205. 1)     1.50348 (187. 1)      .00314 (187. 1)     3.07055 (289. 1)
   1000.0 /    103.06032 (305. 1)   427.40199 (305. 1)    15.05959 (187. 1)      .04380 (187. 1)     5.07164 (289. 1)
    800.0 /    107.80086 (187. 1)   331.47763 (305. 1)   108.70668 (305. 1)      .57670 (187. 1)     8.50962 (289. 1)
    600.0 /   1164.95976 (187. 1)   192.61037 (187. 1)   999.93413 (305. 1)    12.40346 (187. 1)    16.37711 (289. 1)
    400.0 /   2586.00357 (305. 1)  3429.66122 (187. 1)   431.43605 (187. 1)   596.57519 (305. 1)    40.20404 (289. 1)
    200.0 /   3417.10876 (262. 1)  5034.82111 (305. 1)  8261.22119 (305. 1)  1618.61168 (187. 1)   159.62988 (289. 1)
       .0 /   2113.19528 (262. 1)  3410.68469 (262. 1)  6411.06494 (262. 1) 14624.32703 (262. 1)      .00000 (  0. 0)
   -200.0 /     16.72914 (262. 1)      .65443 (262. 1)      .00080 (187. 1)      .00000 (337. 1) 29257.33984 (337. 1)
   -400.0 /       .00006 (187. 1)      .00000 (187. 1)      .00000 (337. 1)      .08076 (337. 1) 12556.40901 (337. 1)
   -600.0 /       .00000 (187. 1)      .00000 (337. 1)      .00000 (337. 1)    41.96467 (337. 1)  6761.63867 (337. 1)
   -800.0 /       .00000 (337. 1)      .00000 (337. 1)      .00620 (337. 1)   250.86494 (337. 1)  4217.97260 (337. 1)
  -1000.0 /       .00000 ([illegible]37. 1)      .00000 (337. 1)      .71882 (337. 1)   442.10267 (337. 1)  2898.65292 (337. 1)
  -1250.0 /       .00000 (337. 1)      .00420 (337. 1)    13.46043 (337. 1)   557.08878 (337. 1)  2017.04434 (337. 1)
  -1500.0 /       .00006 (337. 1)      .24976 (337. 1)    54.82798 (337. 1)   589.01745 (337. 1)  1501.84814 (337. 1)
  -2000.0 /       .12187 (337. 1)    12.00114 (337. 1)   160.56051 (337. 1)   549.62419 (337. 1)   949.64354 (337. 1)
  -3000.0 /     20.03640 (337. 1)    98.79222 (337. 1)   227.32941 (337. 1)   396.21806 (337. 1)   513.20028 (337. 1)
```

FIGURE C-7. (Continued)

```
                                                                                                  HIGH
                                                                                                  24-HR
                                                                                                  SGROUP#  1
                          *** --  HYPOTHETICAL POTASH PROCESSING PLANT - CONCENTRATION  -- ***

                       * HIGHEST 24-HOUR AVERAGE CONCENTRATION (MICROGRAMS/CUBIC METER)      *
                                         * FROM SOURCES:        1,
                                              * FOR THE RECEPTOR GRID *

                    * MAXIMUM VALUE EQUALS  29257.33984 AND OCCURRED AT (         .0,    -200.0) *

   Y-AXIS   /                                               X-AXIS (METERS)
  (METERS)  /              200.0                 400.0                 600.0                 800.0                 1000.0
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

    3000.0 /      12.09791 (289,  1)     95.99378 (289,  1)    208.16702 (289,  1)    210.70117 (289,  1)    123.79415 (289,  1)
    2000.0 /      72.26886 (289,  1)    408.23549 (289,  1)    279.99178 (289,  1)    395.55615 (289,  1)    506.41706 (289,  1)
    1500.0 /     309.13699 (289,  1)    640.51051 (289,  1)    631.27656 (289,  1)    900.32335 (289,  1)    579.07925 (312,  1)
    1250.0 /     692.94864 (289,  1)    535.10152 (289,  1)   1212.21214 (289,  1)    760.05359 (289,  1)   1535.92755 (312,  1)
    1000.0 /    1264.42076 (289,  1)   1213.19186 (289,  1)   1356.18518 (289,  1)   2180.26080 (312,  1)   1233.37479 (312,  1)
     800.0 /    1862.76083 (289,  1)   2495.05028 (289,  1)   2630.63773 (312,  1)   1791.38394 (312,  1)   1324.06496 (299,  1)
     600.0 /    1880.63634 (289,  1)   2678.74228 (312,  1)   2905.20343 (312,  1)   1902.53619 (299,  1)   1912.80093 (299,  1)
     400.0 /    7380.99609 (289,  1)   5631.48242 (312,  1)   3601.52902 (299,  1)   1782.01617 (299,  1)    754.60027 (299,  1)
     200.0 /   13594.94873 (312,  1)   5105.16809 (299,  1)    534.33291 (299,  1)   1363.01515 (312,  1)    392.20446 (312,  1)
         0 /     728.76321 (229,  1)    491.65845 (229,  1)    293.93680 (229,  1)    192.29752 (229,  1)    135.66249 (229,  1)
    -200.0 /    3096.53659 (229,  1)   7997.71472 (229,  1)   2584.90671 (229,  1)    833.65382 (229,  1)    250.04896 (229,  1)
    -400.0 /    7299.68079 ( 51,  1)   1015.86878 (229,  1)   1761.94778 (229,  1)   2744.46030 (229,  1)   1336.52791 (229,  1)
    -600.0 /    4195.57330 ( 51,  1)   1210.95793 ( 51,  1)    491.51054 (229,  1)    925.43362 (229,  1)   1236.53349 (229,  1)
    -800.0 /    1835.72150 (337,  1)   2395.10950 ( 51,  1)    399.74553 ( 51,  1)    292.65735 (229,  1)    883.61901 (229,  1)
   -1000.0 /    1727.78735 (337,  1)   2078.45715 ( 51,  1)    773.98990 ( 51,  1)    162.50557 ( 51,  1)    196.84149 (229,  1)
   -1250.0 /    2039.88640 (337,  1)   1196.73647 ( 51,  1)   1293.01970 ( 51,  1)    406.83203 ( 51,  1)    109.67669 ( 51,  1)
   -1500.0 /    1821.19019 (337,  1)    654.31646 (337,  1)   1084.91153 ( 51,  1)    675.81919 ( 51,  1)    256.72969 ( 51,  1)
   -2000.0 /    1091.00719 (337,  1)    524.65175 (337,  1)    507.92515 ( 51,  1)    600.26542 ( 51,  1)    539.92422 ( 51,  1)
   -3000.0 /     479.52023 (337,  1)    611.11151 (337,  1)    265.07733 (337,  1)    212.32002 (337,  1)    300.43372 ( 51,  1)
```

FIGURE C-7.   (Continued)

```
                                                                                        HIGH
                                                                                        24-HR
       *** --  HYPOTHETICAL POTASH PROCESSING PLANT - CONCENTRATION  -- ***             SGROUP#  1

      * HIGHEST 24-HOUR AVERAGE CONCENTRATION (MICROGRAMS/CUBIC METER)     *
                          * FROM SOURCES:         1,
                             * FOR THE RECEPTOR GRID *

   * MAXIMUM VALUE EQUALS  29257.33984 AND OCCURRED AT (          .0,    -200.0) *

  Y-AXIS   /                                       X-AXIS (METERS)
 (METERS)  /          1250.0                1500.0               2000.0               3000.0
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

    3000.0 /    232.93274 (289, 1)    308.86749 (289, 1)    103.11969 (312, 1)    198.61736 (299, 1)
    2000.0 /    388.30664 (289, 1)    613.30634 (312, 1)    386.83041 (299, 1)    260.78502 (299, 1)
    1500.0 /   1157.59996 (312, 1)    617.68366 (312, 1)    418.99267 (299, 1)    197.32846 (299, 1)
    1250.0 /    843.64931 (312, 1)    749.72033 (299, 1)    594.75001 (299, 1)    131.08338 (299, 1)
    1000.0 /    918.70258 (299, 1)    816.41238 (299, 1)    390.22298 (299, 1)     34.40998 (299, 1)
     800.0 /   1198.75235 (299, 1)    732.87447 (299, 1)    240.38709 (299, 1)    138.52283 (312, 1)
     600.0 /    842.67531 (299, 1)    309.74961 (299, 1)    103.29487 (312, 1)     50.33080 (312, 1)
     400.0 /     98.41490 (312, 1)    449.64553 (312, 1)    108.72939 (312, 1)    135.59004 (299, 1)
     200.0 /    476.74028 (299, 1)    414.32555 (299, 1)    122.60080 (299, 1)     26.02315 (229, 1)
        .0 /     96.84216 (229, 1)     73.09407 (229, 1)     46.51416 (229, 1)     24.81405 (229, 1)
    -200.0 /     62.48043 (229, 1)     18.66026 (229, 1)      3.62507 (229, 1)      3.00988 (229, 1)
    -400.0 /    694.99847 (229, 1)    346.06254 (229, 1)     72.33568 (229, 1)      4.20383 (229, 1)
    -600.0 /   1295.53807 (229, 1)    673.32644 (229, 1)    284.09501 (229, 1)     34.60614 (229, 1)
    -800.0 /    659.75797 (229, 1)    901.26665 (229, 1)    412.39845 (229, 1)    108.52377 (229, 1)
   -1000.0 /    611.78599 (229, 1)    353.98938 (229, 1)    624.02987 (229, 1)    170.60395 (229, 1)
   -1250.0 /    131.95607 (229, 1)    439.53657 (229, 1)    336.35190 (229, 1)    218.67608 (229, 1)
   -1500.0 /     52.19541 ( 51, 1)     95.09326 (229, 1)    176.08272 (229, 1)    323.26402 (229, 1)
   -2000.0 /    199.56817 ( 51, 1)     84.66453 ( 51, 1)     56.71505 (229, 1)    103.10881 (229, 1)
   -3000.0 /    359.34361 ( 51, 1)    279.02787 ( 51, 1)     80.32958 ( 51, 1)     27.30454 (229, 1)
```

FIGURE C-7. (Continued)

```
                                                                                          HIGH
                                                                                          24-HR
                                                                                          SGROUP# 1
               *** --  HYPOTHETICAL POTASH PROCESSING PLANT - CONCENTRATION  -- ***

               * HIGHEST 24-HOUR AVERAGE CONCENTRATION (MICROGRAMS/CUBIC METER)     *
                                * FROM SOURCES:        1,
                             * FOR THE DISCRETE RECEPTOR POINTS *

  - RNG -    - DIR -     CON.      (DAY,PER.)          - RNG -    - DIR -     CON.      (DAY,PER.)
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

    555.0      317.0    363.35759  (187, 1)             620.0      318.0    281.45566  (187, 1)
    685.0      320.0    242.87609  (187, 1)             735.0      322.0    367.98349  (305, 1)
    800.0      326.0    833.51421  (305, 1)             860.0      331.0    478.96017  (305, 1)
    900.0      336.0     61.94616  (205, 1)             920.0      341.0      6.68790  (187, 1)
    940.0      346.0       .39082  (187, 1)             940.0      351.0       .00820  (187, 1)
    935.0      356.0       .04938  (289, 1)             910.0        1.0     15.25862  (289, 1)
    950.0        6.0    310.12568  (289, 1)            1015.0       11.0   1252.37616  (289, 1)
   1055.0       16.0    984.78966  (289, 1)            1075.0       21.0   1064.22385  (289, 1)
   1075.0       26.0   1028.96118  (289, 1)            1045.0       31.0   1605.53326  (289, 1)
    995.0       36.0   2312.04056  (312, 1)             910.0       41.0   3716.50061  (312, 1)
    835.0       43.0   3334.30417  (312, 1)             755.0       45.0   3532.88397  (312, 1)
    620.0       47.0   5498.56348  (299, 1)             525.0       49.0   6816.95062  (299, 1)
    460.0       51.0   7187.11414  (299, 1)             355.0       56.0   9529.39441  (299, 1)
    355.0       66.0   4968.47260  (299, 1)             355.0       76.0   3324.30942  (312, 1)
    355.0       86.0    668.70051  (299, 1)             350.0       96.0    208.95413  (229, 1)
    345.0      106.0   5091.62152  (229, 1)             335.0      116.0  11717.47192  (229, 1)
    325.0      126.0   5320.33734  (229, 1)             380.0      136.0   1627.61234  (229, 1)
    420.0      141.0   1051.16229  ( 51, 1)             450.0      146.0   2513.70938  ( 51, 1)
    480.0      151.0   4777.69012  ( 51, 1)             505.0      156.0   7180.53339  ( 51, 1)
    535.0      161.0   5699.72949  ( 51, 1)             575.0      166.0   3225.32541  (337, 1)
    620.0      171.0   6371.78607  (337, 1)             665.0      176.0   5821.85095  (337, 1)
    705.0      181.0   5090.61237  (337, 1)             730.0      186.0   2722.19998  (337, 1)
    745.0      191.0    846.50612  (337, 1)             755.0      196.0    119.60140  (337, 1)
    755.0      201.0      3.92454  (337, 1)             745.0      206.0       .02435  (337, 1)
    730.0      211.0       .00004  (337, 1)             705.0      216.0       .00000  (337, 1)
    690.0      221.0       .00000  (337, 1)             690.0      226.0       .00000  (187, 1)
    690.0      231.0       .00000  (187, 1)             680.0      236.0       .00000  (187, 1)
    665.0      241.0       .00001  (187, 1)             645.0      246.0       .00244  (187, 1)
    615.0      251.0       .39407  (262, 1)             575.0      256.0     40.88502  (262, 1)
    530.0      261.0    797.13342  (262, 1)             475.0      266.0   3713.44977  (262, 1)
    410.0      271.0   6243.07268  (262, 1)             365.0      276.0   8224.08228  (262, 1)
    365.0      286.0  10781.29871  (262, 1)             410.0      296.0   9458.34009  (305, 1)
```

FIGURE C-7. (Continued)

```
                                                                                                   MAX 50
                                                                                                   24-HR
                                                                                                   8GROUPS  3
                              *** --  HYPOTHETICAL POTASH PROCESSING PLANT - CONCENTRATION  -- ***

                            * 50 MAXIMUM 24-HOUR AVERAGE CONCENTRATION (MICROGRAMS/CUBIC METER)     *

                                              * FROM SOURCES:       12.   -15.

                                          X        Y(METERS)                                              X        Y(METERS)
                                          OR          OR                                                  OR          OR
                                        RANGE      DIRECTION                                            RANGE      DIRECTION
  RANK       CON.        PER. DAY     (METERS)    (DEGREES)        RANK       CON.        PER. DAY     (METERS)    (DEGREES)
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

    1      365.60716      1  229       345.0        106.0           26      174.78666      1  312       600.0        400.0
    2      357.13231      1  337       200.0       -200.0           27      170.18014      1  305      -200.0        200.0
    3      306.66805      1  312       355.0         66.0           28      160.01897      1  312       460.0         51.0
    4      281.32770      1  299       355.0         66.0           29      151.16765      1  229       400.0       -200.0
    5      274.64339      1  337       200.0       -400.0           30      149.43143      1  262      -200.0           .0
    6      270.49908      1   51       325.0        126.0           31      146.44760      1   51       450.0        146.0
    7      261.61783      1   51       380.0        136.0           32      145.61457      1  337       420.0        141.0
    8      243.53223      1  337       505.0        156.0           33      143.40306      1   51       400.0       -600.0
    9      238.94873      1  299       400.0        200.0           34      138.19619      1  312       525.0         49.0
   10      231.92527      1  205      -200.0        200.0           35      134.27904      1  229       335.0        116.0
   11      230.57580      1  337       480.0        151.0           36      133.93340      1  299       600.0        400.0
   12      227.51217      1  312       400.0        200.0           37      133.60077      1  337       200.0       -800.0
   13      223.18893      1  299       355.0         76.0           38      130.02702      1  312       800.0        600.0
   14      221.24822      1  337       535.0        161.0           39      129.24978      1  187       365.0        286.0
   15      215.76077      1   51       420.0        141.0           40      129.15974      1  289       460.0         51.0
   16      214.17474      1  262          .0           .0           41      128.57034      1  299       800.0        400.0
   17      213.90416      1  312       355.0         56.0           42      128.26113      1  187       410.0        296.0
   18      205.91974      1   51       200.0       -200.0           43      126.49464      1  262      -600.0        200.0
   19      193.78723      1  262       365.0        286.0           44      125.83667      1   51       400.0       -400.0
   20      192.98119      1  337       450.0        146.0           45      124.67772      1  262       410.0        296.0
   21      189.49826      1  337       200.0       -600.0           46      123.24991      1  262       365.0        276.0
   22      184.51424      1  289       200.0        200.0           47      122.15517      1  289       400.0        400.0
   23      182.02673      1  229       600.0       -200.0           48      120.45045      1  305       410.0        296.0
   24      176.59334      1  289       355.0         56.0           49      118.68963      1  205      -600.0        400.0
   25      176.15851      1  337       575.0        166.0           50      117.97248      1  187      -200.0        200.0
```

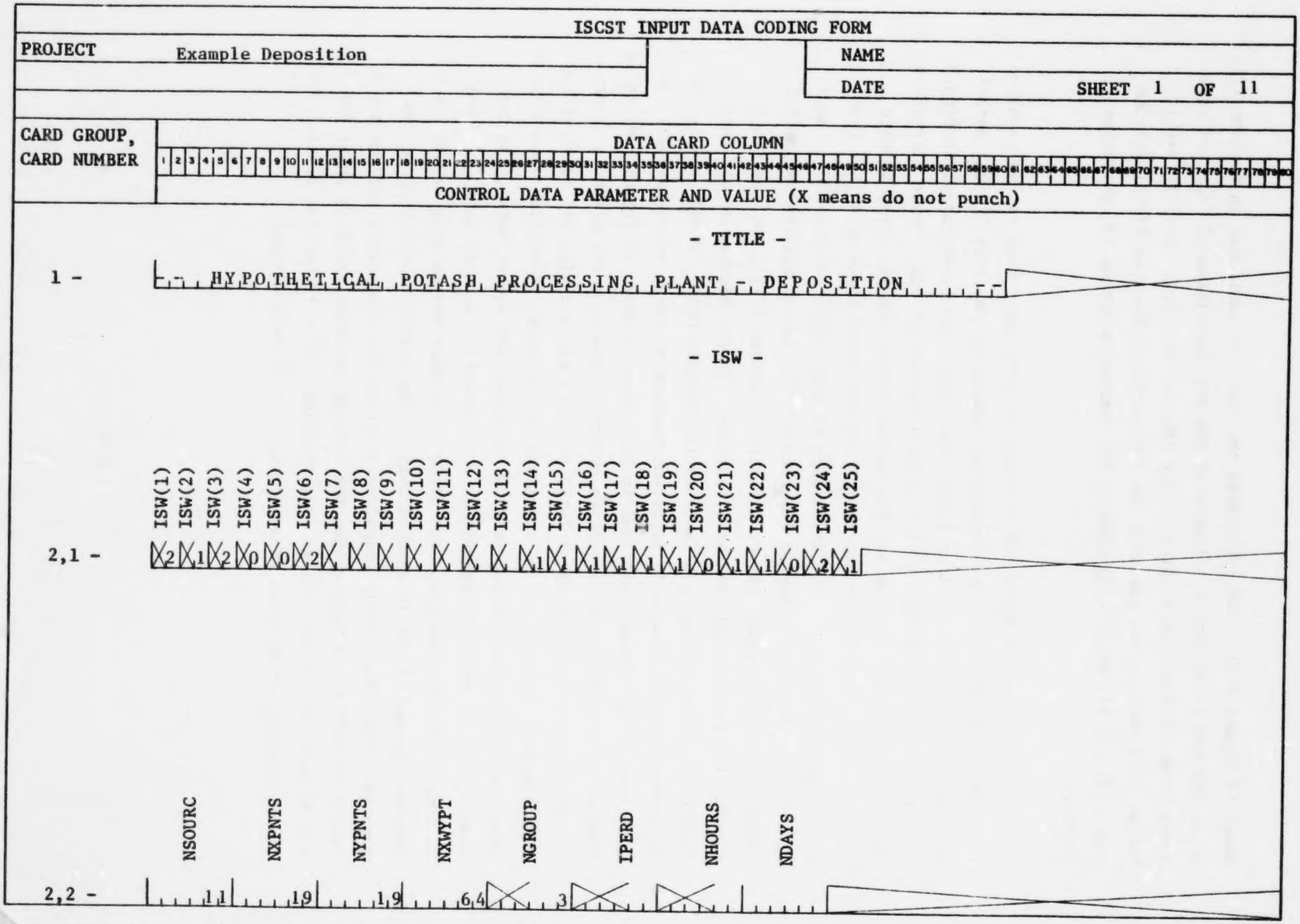
FIGURE C-8. Listing of the table of the maximum 50 average concentration values computed from Sources 12 to 15 by the hypothetical potash processing plant concentration run.

gram found distances between sources and receptors less than 100 meters, a diagnostic table is printed, as shown in Figure C-4, which lists all source-receptor combinations found and the distance computed between each combination. Note that a negative distance implies that the receptor lies within the boundaries of the source. Figure C-5 shows one table out of the fifty produced by this example run for the ISW(16) option. Note that the heading of the table identifies the day, averaging period and source group that represents the average concentration values printed for all receptors. Also, note that the average concentration values printed for the receptor grid provide ease of interpretation of the impact of the pollutant over the receptor grid domain. That is, the table format allows one to obtain a "visual" picture of the pollutant's pattern or trend. This feature occurs only with Cartesian receptor grids because the receptor grid locations are entered in ascending order as shown in Figure C-1. An illustration of an "N"-day table generated by the ISW(15) option is shown in Figure C-6. The format of this table is similar to the tables produced by the ISW(16) option mentioned above. Figure C-7 shows the content and format of a highest concentration table produced by the ISW(17) option. The content includes the highest average concentration values calculated for all receptors as well as the day and time period when each value occurred. In this case, only one averaging period is possible per day and a "1" is printed for the averaging period. The second-highest table (not shown) is identical in format to the highest concentration table. Option ISW(18) generates the maximum 50 tables, an example of which is shown in Figure C-8.

C.3 EXAMPLE DRY DEPOSITION RUN

Because the preparation of a total deposition run is very similar to the preparation of the average concentration run discussed in the preceding section, only the differences between the two runs are discussed in this section. The primary difference between the two runs is that the deposition model requires all sources to have gravitational settling categories (parameter NVS > 0). If the program detects any sources which do not have any gravitational settling categories, the program prints the error message shown in Figure 3-9(e) and terminates the run. As mentioned in Section 2.6, it is desired to obtain an estimate of the dry deposition of fugitive emissions from the ore pile (Source 1) and the conveyor belt (Sources 2-11). Hence, this example run excludes the roof monitor (Sources 12-15) and the stack (Source 16) which were modeled for concentration in the preceding section.

Figure C-9 shows the 82 lines of card input data values required to compute the desired total deposition values for the hypothetical potash processing plant. The heading label, the first line (card image) in Figure C-9, indicates to the user that this is a deposition run. Three differences between this deposition run and the concentration run are noted in Card Group 2, which consists of the second and the third lines of Figure C-9 according to Table 3-4. One difference is that ISW(1) equals "2" to indicate to the program to compute deposition. The second difference is that NSOURC equals "11" since the roof monitor (Sources 12-15) and the stack (Source 16) are not modeled for deposition. Third, because of the fewer number of sources, there are fewer source groups; hence, NGROUP equals "3". Furthermore, Card Group 4 is different because of fewer source groups. As indicated by the values contained in Card Group 4 shown in Figure C-9, it is desired to see the total deposition contributions from the ore pile (Source 1), the conveyor belt (Sources 2-11) and both the ore pile and conveyor belt. A preliminary estimate of the magnitude of the total deposition values indicate that the desired output units be in grams per square meter, the program's default units for deposition calculations. Because there are only 11 sources in this example, Card Group 6 contains source data values for 11 sources instead of the 16 sources used in the example concentration run. Note that the total hourly emissions in grams for the eleven sources are a factor of 3600 times larger than the average emission rates in grams per second used to compute average concentration (refer to Section 2.4.3.1 for an explanation of emission rates for deposition calculations).



ISCST INPUT DATA CODING FORM

PROJECT Example Deposition

NAME

DATE

SHEET 1 OF 11

CARD GROUP, CARD NUMBER

DATA CARD COLUMN

CONTROL DATA PARAMETER AND VALUE (X means do not punch)

- TITLE -

1 - HYPOTHETICAL POTASH PROCESSING PLANT - DEPOSITION

- ISW -

2,1 -

ISW(1)	ISW(2)	ISW(3)	ISW(4)	ISW(5)	ISW(6)	ISW(7)	ISW(8)	ISW(9)	ISW(10)	ISW(11)	ISW(12)	ISW(13)	ISW(14)	ISW(15)	ISW(16)	ISW(17)	ISW(18)	ISW(19)	ISW(20)	ISW(21)	ISW(22)	ISW(23)	ISW(24)	ISW(25)
X2	X1	X2	X0	X0	X2	X	X	X	X	X	X	X	X1	X1	X1	X1	X1	X1	X0	X1	X1	X0	X2	X1

2,2 -

NSOURC	NXPNTS	NYPNTS	NXWYPT	NGROUP	IPERD	NHOURS	NDAYS
11	19	19	64	X 3	X	X	

FIGURE C-9. Card input data for the hypothetical potash processing plant deposition run.

ISCST INPUT DATA CODING FORM (Continued)

PROJECT Example Deposition

NAME

DATE

SHEET 2 OF 11

CARD GROUP, CARD NUMBER

DATA CARD COLUMN

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80

RECEPTOR DATA PARAMETER AND VALUE

- GRIDX (axis of grid system, omit if NXPNTS OR NYPNTS = 0) -

3,1 -	-3000	-2000	-1500	-1250	-1000	-800	-600	-400
	-200	0	200	400	600	800	1000	1250
	1500	2000	3000					

- GRIDY (axis of grid system, omit if NXPNTS or NYPNTS = 0) -

3,2 -	-3000	-2000	-1500	-1250	-1000	-800	-600	-400
	-200	0	200	400	600	800	1000	1250
	1500	2000	3000					

FIGURE C-9. (Continued)

ISCST INPUT DATA CODING FORM (Continued)

PROJECT Example Deposition

NAME

DATE SHEET 3 OF 11

CARD GROUP, CARD NUMBER	DATA CARD COLUMN RECEPTOR DATA PARAMETER AND VALUE							
	- XDIS (discrete receptors, omit if NXWYPT = 0) -							
	555	620	685	735	800	860	900	920
	940	940	935	910	950	1015	1055	1075
	075	1045	995	910	855	755	620	525
	460	355	355	355	355	350	345	335
3,3 -	325	380	420	450	480	505	535	575
	620	665	705	730	745	755	765	745
	730	705	690	690	690	680	655	645
	615	575	530	475	410	365	365	410
	- YDIS (discrete receptors, omit if NXWYPT = 0) -							
	317	318	320	322	326	331	336	341
	346	351	356	1	6	11	16	21
	26	31	36	41	43	45	47	49
	51	56	66	76	86	96	106	116
3,4 -	126	136	141	146	151	156	161	166
	171	176	181	186	191	196	201	206
	211	216	221	226	231	236	241	246
	251	256	261	266	271	276	286	296

FIGURE C-9. (Continued)

ISCST INPUT DATA CODING FORM (Continued)

PROJECT Example Deposition

NAME

DATE

SHEET 4 OF 11

CARD GROUP, CARD NAME

DATA CARD COLUMN

SOURCE GROUP DATA PARAMETER AND VALUE (X means do not punch)

- NSOGRP (array, omit if NGROUP = 0) -

4,1 -

1	2	2

- IDSOR (array, omit if NGROUP = 0) -

4,2 -

1	2	-11	1	-11

FIGURE C-9. (Continued)

ISCST INPUT DATA CODING FORM (Continued)

PROJECT Example Deposition

NAME

DATE SHEET 5 OF 11

CARD GROUP, CARD NUMBER

DATA CARD COLUMN

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80

METEOROLOGICAL CONSTANTS DATA PARAMETER AND VALUE (X means do not punch)

- PDEF (array, omit if ISW(21) ≠ 2) -

5,1-6 -

- DTHDEF (array, omit if ISW(22) ≠ 2) -

5,7-12 -

ZR - UCATS (array) -

5,13 - - one blank card, default units -

FIGURE C-9. (Continued)

ISCST INPUT DATA CODING FORM (Continued)

PROJECT Example Deposition

NAME

DATE SHEET 6 OF 11

DATA CARD COLUMN

CARD GROUP, CARD NUMBER

METEOROLOGICAL CONSTANTS AND IDENTIFICATION LABEL DATA PARAMETER AND VALUE (X means do not punch)

	TK	BETA1	BETA2	DECAY	IQUN	ICHIUN	IMET	ITAP	
5,14 -	one blank card, default units								X

- IDAY (array, omit if ISW(19) = 2) -

5,15-19 -

```
                                                  1
           - one blank card -
                          1                 1                       1
                      1                         1         1    1      1
                1                             XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
```

- (omit if ISW(19) = 2) -

	ISS	ISY	IUS	IUY	
5,20 -	14913	64	14918	64	X

FIGURE C-9. (Continued)

ISCST INPUT DATA CODING FORM (Continued)

PROJECT Example Deposition	**NAME**
	DATE **SHEET** 7 **OF** 11

CARD GROUP, CARD NUMBER — **DATA CARD COLUMN** 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80

SOURCE DATA PARAMETER AND VALUE

6,1 -

NSO	ITYPE	WAKE	NVS	QFLG	Q	XS	YS	ZS	HS	TS	VS	D	HB	HL	HW
1	2		6	3	360	-13.3	-13.3	0	10.0		26.6				
2	1		6	0	468	20	0	0	.9	1	4.7				
3	1		6	0	468	30	0	0	2.6	1	4.7				
4	1		6	0	468	40	0	0	4.3	1	4.7				
5	1		6	0	468	49	0	0	6.1	1	4.7				
6	1		6	0	468	59	0	0	7.8	1	4.7				
7	1		6	0	468	69	0	0	9.6	1	4.7				
8	1		6	0	468	79	0	0	11.3	1	4.7				
9	1		6	0	468	89	0	0	13.0	1	4.7				
10	1		6	0	468	99	0	0	14.8	1	4.7				
11	1		6	0	468	109	0	0	16.5	1	4.7				

FIGURE C-9. (Continued)

ISCST INPUT DATA CODING FORM (Continued)

PROJECT Example Deposition

NAME

DATE SHEET 8 OF 11

CARD GROUP, CARD NUMBER	DATA CARD COLUMN 1–10	11–20	21–30	31–40	41–50	51–60	61–70	71–80
	SOURCE DATA PARAMETER AND VALUE							
	- PHI (array, omit if NVS = 0 for all sources) -							
	.1	.4	.28	.12	.06	.04		
	.1	.4	.28	.12	.06	.04		
	.1	.4	.28	.12	.06	.04		
	.1	.4	.28	.12	.06	.04		
	.1	.4	.28	.12	.06	.04		
	.1	.4	.28	.12	.06	.04		
	.1	.4	.28	.12	.06	.04		
	.1	.4	.28	.12	.06	.04		
	.1	.4	.28	.12	.06	.04		
	.1	.4	.28	.12	.06	.04		
6,2 -	.1	.4	.28	.12	.06	.04		

FIGURE C-9. (Continued)

ISCST INPUT DATA CODING FORM (Continued)

PROJECT Example Deposition

NAME

DATE SHEET 9 OF 11

CARD GROUP, CARD NUMBER	DATA CARD COLUMN / SOURCE DATA PARAMETER AND VALUE							
	- VSN (array, omit if NVS = 0 for all sources) -							
	.001	.007	.019	.037	.061	.099		
	.001	.007	.019	.037	.061	.099		
	.001	.007	.019	.037	.061	.099		
	.001	.007	.019	.037	.061	.099		
	.001	.007	.019	.037	.061	.099		
	.001	.007	.019	.037	.061	.099		
	.001	.007	.019	.037	.061	.099		
	.001	.007	.019	.037	.061	.099		
	.001	.007	.019	.037	.061	.099		
	.001	.007	.019	.037	.061	.099		
6,3 -	.001	.007	.019	.037	.061	.099		

FIGURE C-9. (Continued)

ISCST INPUT DATA CODING FORM (Continued)

PROJECT Example Deposition

NAME

DATE SHEET 10 OF 11

CARD GROUP, CARD NUMBER

DATA CARD COLUMN

SOURCE DATA PARAMETER AND VALUE

- GAMMA (array, omit if NVS = 0 for all sources) -

	1.0	.82	.72	.65	.59	.5		
	1.0	.82	.72	.65	.59	.5		
	1.0	.82	.72	.65	.59	.5		
	1.0	.82	.72	.65	.59	.5		
	1.0	.82	.72	.65	.59	.5		
	1.0	.82	.72	.65	.59	.5		
	1.0	.82	.72	.65	.59	.5		
	1.0	.82	.72	.65	.59	.5		
	1.0	.82	.72	.65	.59	.5		
	1.0	.82	.72	.65	.59	.5		
6,4 -	1.0	.82	.72	.65	.59	.5		

FIGURE C-9. (Continued)

ISCST INPUT DATA CODING FORM (Continued)

PROJECT Example Deposition

NAME

DATE **SHEET** 11 **OF** 11

CARD GROUP, CARD NUMBER	DATA CARD COLUMN 1–10	11–20	21–30	31–40	41–50	51–60	61–70	71–80
	SOURCE DATA PARAMETER AND VALUE							
	- QTK (array, omit if ISW(23) = 0 and QFLG = 0 for all sources) -							
6,5 -	1	1	1	1	1	1	1	5
	5	5	5	5	5	5	5	1
	1	1	1	1	1	1	1	1

IGURE C-9. (Continued)

The estimated run time, required data storage and pages of print output for this example run are different than the estimates computed for the example run discussed in the preceding section due to a fewer number of sources (and consequently a fewer number of source groups). The parameters used to compute these estimates, which differ from the previous example run, are NSOURC, which equals "11" instead of "16", and NGROUP which equals "3" instead of "5". From these parameter values and the values of the parameters used in the preceding section, the estimated run time equals about 12.5 minutes, the amount of data storage required equals 11634 words and the number of pages of print output equals 189.

Figure C-10 is a listing of the card input data values used to compute 24-hour total deposition values for the hypothetical potash processing plant. The differences between the input data values for the concentration and deposition example runs, as mentioned in the first two paragraphs of this section, are reflected in Figure C-10. Examples of the print output produced by this example run are not shown because the format of the output tables are the same as those of the example run discussed in the preceding section. The only exceptions are in the heading where the words "AVERAGE CONCENTRATION" are replaced by "TOTAL DEPOSITION" and the output units are (GRAMS/SQUARE METER) instead of (MICROGRAMS/CUBIC METER).

```
*** --  HYPOTHETICAL POTASH PROCESSING PLANT - DEPOSITION      -- ***

CALCULATE (CONCENTRATION=1,DEPOSITION=2)                         ISW(1) =   2
RECEPTOR GRID SYSTEM (RECTANGULAR=1 OR 3, POLAR=2 OR 4)          ISW(2) =   1
DISCRETE RECEPTOR SYSTEM (RECTANGULAR=1 POLAR=2)                 ISW(3) =   2
TERRAIN ELEVATIONS ARE READ (YES=1 NO=0)                         ISW(4) =   0
CALCULATIONS ARE WRITTEN TO TAPE (YES=1 NO=0)                    ISW(5) =   0
LIST ALL INPUT DATA (NO=0,YES=1,MET DATA ALSO=2)                 ISW(6) =   2

COMPUTE AVERAGE CONCENTRATION (OR TOTAL DEPOSITION)
WITH THE FOLLOWING TIME PERIODS:
  HOURLY (YES=1.NO=0)                                            ISW(7) =   0
  2-HOUR (YES=1.NO=0)                                            ISW(8) =   0
  3-HOUR (YES=1.NO=0)                                            ISW(9) =   0
  4-HOUR (YES=1.NO=0)                                           ISW(10) =   0
  6-HOUR (YES=1.NO=0)                                           ISW(11) =   0
  8-HOUR (YES=1.NO=0)                                           ISW(12) =   0
  12-HOUR (YES=1,NO=0)                                          ISW(13) =   0
  24-HOUR (YES=1,NO=0)                                          ISW(14) =   1
PRINT "N"-DAY TABLE(S) (YES=1 NO=0)                             ISW(15) =   1

PRINT THE FOLLOWING TYPES OF TABLES WHOSE TIME PERIODS ARE
SPECIFIED BY ISW(7) THROUGH ISW(14):
  DAILY TABLES (YES=1,NO=0)                                     ISW(16) =   1
  HIGHEST & SECOND HIGHEST TABLES (YES=1,NO=0)                  ISW(17) =   1
  MAXIMUM 50 TABLES (YES=1,NO=0)                                ISW(18) =   1
METEOROLOGICAL DATA INPUT METHOD (PRE-PROCESSED=1,CARD=2)       ISW(19) =   1
RURAL-URBAN OPTION (RURAL=0,URBAN MODE 1=1,URBAN MODE 2=2)      ISW(20) =   0
WIND PROFILE EXPONENT VALUES (DEFAULTS=1,USER ENTERS=2,3)       ISW(21) =   1
VERTICAL POT. TEMP. GRADIENT VALUES (DEFAULTS=1,USER ENTERS=2,3) ISW(22) =  1
SCALE EMISSION RATES FOR ALL SOURCES (NO=0,YES>0)               ISW(23) =   0
PROGRAM CALCULATES FINAL PLUME RISE ONLY (YES=1,NO=2)           ISW(24) =   2
PROGRAM ADJUSTS ALL STACK HEIGHTS FOR DOWNWASH (YES=2,NO=1)     ISW(25) =   1

NUMBER OF INPUT SOURCES                                          NSOURC =  11
NUMBER OF SOURCE GROUPS (=0,ALL SOURCES)                         NGROUP =   3
TIME PERIOD INTERVAL TO BE PRINTED (=0,ALL INTERVALS)             IPERD =   0
NUMBER OF X (RANGE) GRID VALUES                                  NXPNTS =  19
NUMBER OF Y (THETA) GRID VALUES                                  NYPNTS =  19
NUMBER OF DISCRETE RECEPTORS                                     NXWYPT =  64
SOURCE EMISSION RATE UNITS CONVERSION FACTOR                         TK = .10000+01
ENTRAINMENT COEFFICIENT FOR UNSTABLE ATMOSPHERE                   BETA1 = .600
ENTRAINMENT COEFFICIENT FOR STABLE ATMOSPHERE                     BETA2 = .600
HEIGHT ABOVE GROUND AT WHICH WIND SPEED WAS MEASURED                 ZR =  10.00  METERS
LOGICAL UNIT NUMBER OF METEOROLOGICAL DATA                         IMET =   9
DECAY COEFFICIENT FOR PHYSICAL OR CHEMICAL DEPLETION              DECAY =  .000000
SURFACE STATION NO.                                                 ISS = 14913
YEAR OF SURFACE DATA                                                ISY = 64
UPPER AIR STATION NO                                                IUS = 14918
YEAR OF UPPER AIR DATA                                              IUY = 64
ALLOCATED DATA STORAGE                                            LIMIT = 43500 WORDS
REQUIRED DATA STORAGE FOR THIS PROBLEM RUN                        MIMIT = 11634 WORDS
```

FIGURE C-10. Listing of the input data for the hypothetical potash processing plant deposition run.

```
                         *** --  HYPOTHETICAL POTASH PROCESSING PLANT - DEPOSITION      -- ***

                                  *** METEOROLOGICAL DAYS TO BE PROCESSED ***
                                                  (IF=1)

0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0
1 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 1 0 0 0   0 0 0 0 0 0 0 0 0 0
0 0 0 0 1 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 1 0   0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0   0 1 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 1 0   0 0 0 0 0 0 0 0 1 0
0 0 0 0 1 0 0 0 0 0   0 1 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 1 0 0 0   0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0
                      *** NUMBER OF SOURCE NUMBERS REQUIRED TO DEFINE SOURCE GROUPS ***
                                                 (NSOGRP)

   1.   2.   2.
                                  *** SOURCE NUMBERS DEFINING SOURCE GROUPS ***
                                                  (IDSOR)

    1.     2.   -11.     1.   -11.
                      *** UPPER BOUND OF FIRST THROUGH FIFTH WIND SPEED CATEGORIES ***
                                               (METERS/SEC)

                                  1.54.   3.09.   5.14.   8.23.  10.80.

                                        *** WIND PROFILE EXPONENTS ***

   STABILITY                                   WIND SPEED CATEGORY
   CATEGORY          1             2              3              4              5              6
       A         .10000+00     .10000+00      .10000+00      .10000+00      .10000+00      .10000+00
       B         .15000+00     .15000+00      .15000+00      .15000+00      .15000+00      .15000+00
       C         .20000+00     .20000+00      .20000+00      .20000+00      .20000+00      .20000+00
       D         .25000+00     .25000+00      .25000+00      .25000+00      .25000+00      .25000+00
       E         .30000+00     .30000+00      .30000+00      .30000+00      .30000+00      .30000+00
       F         .30000+00     .30000+00      .30000+00      .30000+00      .30000+00      .30000+00
```

FIGURE C-10. (Continued)

```
*** --  HYPOTHETICAL POTASH PROCESSING PLANT - DEPOSITION     -- ***


                    *** VERTICAL POTENTIAL TEMPERATURE GRADIENTS ***
                              (DEGREES KELVIN PER METER)

      STABILITY                         WIND SPEED CATEGORY
      CATEGORY        1            2            3            4            5            6
          A        .00000       .00000       .00000       .00000       .00000       .00000
          B        .00000       .00000       .00000       .00000       .00000       .00000
          C        .00000       .00000       .00000       .00000       .00000       .00000
          D        .00000       .00000       .00000       .00000       .00000       .00000
          E        .20000-01    .20000-01    .20000-01    .20000-01    .20000-01    .20000-01
          F        .35000-01    .35000-01    .35000-01    .35000-01    .35000-01    .35000-01

                    *** X-COORDINATES OF RECTANGULAR GRID SYSTEM ***
                                      (METERS)

  -3000.0,   -2000.0,   -1500.0,   -1250.0,   -1000.0,    -800.0,    -600.0,    -400.0,    -200.0,         .0,
    200.0,     400.0,     600.0,     800.0,    1000.0,    1250.0,    1500.0,    2000.0,    3000.0,

                    *** Y-COORDINATES OF RECTANGULAR GRID SYSTEM ***
                                      (METERS)

  -3000.0,   -2000.0,   -1500.0,   -1250.0,   -1000.0,    -800.0,    -600.0,    -400.0,    -200.0,         .0,
    200.0,     400.0,     600.0,     800.0,    1000.0,    1250.0,    1500.0,    2000.0,    3000.0,

                  *** RANGE,THETA COORDINATES OF DISCRETE RECEPTORS ***
                                  (METERS,DEGREES)

 (     555.0,     317.0), (     620.0,     318.0), (     685.0,     320.0), (     735.0,     322.0), (     800.0,     326.0),
 (     860.0,     331.0), (     900.0,     336.0), (     920.0,     341.0), (     940.0,     346.0), (     940.0,     351.0),
 (     935.0,     356.0), (     910.0,       1.0), (     950.0,       6.0), (    1015.0,      11.0), (    1055.0,      16.0),
 (    1075.0,      21.0), (    1075.0,      26.0), (    1045.0,      31.0), (     995.0,      36.0), (     910.0,      41.0),
 (     855.0,      43.0), (     755.0,      45.0), (     620.0,      47.0), (     525.0,      49.0), (     460.0,      51.0),
 (     355.0,      56.0), (     355.0,      66.0), (     355.0,      76.0), (     355.0,      86.0), (     350.0,      96.0),
 (     345.0,     106.0), (     335.0,     116.0), (     325.0,     126.0), (     380.0,     136.0), (     420.0,     141.0),
 (     450.0,     146.0), (     480.0,     151.0), (     505.0,     156.0), (     535.0,     161.0), (     575.0,     166.0),
 (     620.0,     171.0), (     665.0,     176.0), (     705.0,     181.0), (     730.0,     186.0), (     745.0,     191.0),
 (     755.0,     196.0), (     755.0,     201.0), (     745.0,     206.0), (     730.0,     211.0), (     705.0,     216.0),
 (     690.0,     221.0), (     690.0,     226.0), (     690.0,     231.0), (     680.0,     236.0), (     665.0,     241.0),
 (     645.0,     246.0), (     615.0,     251.0), (     575.0,     256.0), (     530.0,     261.0), (     475.0,     266.0),
 (     410.0,     271.0), (     365.0,     276.0), (     365.0,     286.0), (     410.0,     296.0), (
```

FIGURE C-10. (Continued)

```
                  *** --  HYPOTHETICAL POTASH PROCESSING PLANT - DEPOSITION     -- ***

                                         *** SOURCE DATA ***

                        EMISSION RATE
                           TYPE=0,1                                        TEMP.    EXIT VEL.
             T W           (GRAMS)                                        TYPE=0     TYPE=0
             Y A NUMBER    TYPE=2                                        (DEG.K)    (M/SEC)              BLDG.     BLDG.     BLDG.
     SOURCE P K  PART.     (GRAMS)        X         Y        BASE         VERT.DIM   HORZ.DIN DIAMETER  HEIGHT    LENGTH     WIDTH
     NUMBER E E  CATS.  *PER METER**2 (METERS)  (METERS)  (METERS) (METERS) TYPE=1    TYPE=1,2  TYPE=0   TYPE=0    TYPE=0    TYPE=0
                                                           ELEV.   HEIGHT  (METERS)  (METERS) (METERS) (METERS)  (METERS)  (METERS)
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

         1  2 0    6      .36000+03     -13.3     -13.3       .0     10.00       .00      26.60      .00      .00       .00       .00
         2  1 0    6      .46800+03      20.0        .0       .0       .90      1.00       4.70      .00      .00       .00       .00
         3  1 0    6      .46800+03      30.0        .0       .0      2.60      1.00       4.70      .00      .00       .00       .00
         4  1 0    6      .46800+03      40.0        .0       .0      4.30      1.00       4.70      .00      .00       .00       .00
         5  1 0    6      .46800+03      49.0        .0       .0      6.10      1.00       4.70      .00      .00       .00       .00
         6  1 0    6      .46800+03      59.0        .0       .0      7.80      1.00       4.70      .00      .00       .00       .00
         7  1 0    6      .46800+03      69.0        .0       .0      9.60      1.00       4.70      .00      .00       .00       .00
         8  1 0    6      .46800+03      79.0        .0       .0     11.30      1.00       4.70      .00      .00       .00       .00
         9  1 0    6      .46800+03      89.0        .0       .0     13.00      1.00       4.70      .00      .00       .00       .00
        10  1 0    6      .46800+03      99.0        .0       .0     14.80      1.00       4.70      .00      .00       .00       .00
        11  1 0    6      .46800+03     109.0        .0       .0     16.50      1.00       4.70      .00      .00       .00       .00
```

FIGURE C-10. (Continued)

```
*** --  HYPOTHETICAL POTASH PROCESSING PLANT - DEPOSITION     -- ***

                          *** SOURCE PARTICULATE DATA ***

*** SOURCE NUMBER =     1 ***

MASS FRACTION =
 .10000, .40000, .28000, .12000, .06000, .04000,

SETTLING VELOCITY(METERS/SEC) =
  .0010,  .0070,  .0190,  .0370,  .0610,  .0990,

SURFACE REFLECTION COEFFICIENT =
1.00000, .82000, .72000, .65000, .59000, .50000,

*** SOURCE NUMBER =     2 ***

MASS FRACTION =
 .10000, .40000, .28000, .12000, .06000, .04000,

SETTLING VELOCITY(METERS/SEC) =
  .0010,  .0070,  .0190,  .0370,  .0610,  .0990,

SURFACE REFLECTION COEFFICIENT =
1.00000, .82000, .72000, .65000, .59000, .50000,

*** SOURCE NUMBER =     3 ***

MASS FRACTION =
 .10000, .40000, .28000, .12000, .06000, .04000,

SETTLING VELOCITY(METERS/SEC) =
  .0010,  .0070,  .0190,  .0370,  .0610,  .0990,

SURFACE REFLECTION COEFFICIENT =
1.00000, .82000, .72000, .65000, .59000, .50000,
```

FIGURE C-10. (Continued)

```
                  *** --  HYPOTHETICAL POTASH PROCESSING PLANT - DEPOSITION     -- ***

                                   *** SOURCE PARTICULATE DATA ***

*** SOURCE NUMBER =     4 ***

MASS FRACTION =
 .10000, .40000, .28000, .12000, .06000, .04000,

SETTLING VELOCITY(METERS/SEC) =
   .0010,  .0070,  .0190,  .0370,  .0610,  .0990,

SURFACE REFLECTION COEFFICIENT =
1.00000, .82000, .72000, .65000, .59000, .50000,

*** SOURCE NUMBER =     5 ***

MASS FRACTION =
 .10000, .40000, .28000, .12000, .06000, .04000,

SETTLING VELOCITY(METERS/SEC) =
   .0010,  .0070,  .0190,  .0370,  .0610,  .0990,

SURFACE REFLECTION COEFFICIENT =
1.00000, .82000, .72000, .65000, .59000, .50000,

*** SOURCE NUMBER =     6 ***

MASS FRACTION =
 .10000, .40000, .28000, .12000, .06000, .04000,

SETTLING VELOCITY(METERS/SEC) =
   .0010,  .0070,  .0190,  .0370,  .0610,  .0990,

SURFACE REFLECTION COEFFICIENT =
1.00000, .82000, .72000, .65000, .59000, .50000,
```

FIGURE C-10. (Continued)

```
*** --  HYPOTHETICAL POTASH PROCESSING PLANT - DEPOSITION     -- ***

                         *** SOURCE PARTICULATE DATA ***

*** SOURCE NUMBER =     7 ***

MASS FRACTION =
 .10000, .40000, .28000, .12000, .06000, .04000,

SETTLING VELOCITY(METERS/SEC) =
  .0010,  .0070,  .0190,  .0370,  .0610,  .0990,

SURFACE REFLECTION COEFFICIENT =
1.00000, .82000, .72000, .65000, .59000, .50000,

*** SOURCE NUMBER =     8 ***

MASS FRACTION =
 .10000, .40000, .28000, .12000, .06000, .04000,

SETTLING VELOCITY(METERS/SEC) =
  .0010,  .0070,  .0190,  .0370,  .0610,  .0990,

SURFACE REFLECTION COEFFICIENT =
1.00000, .82000, .72000, .65000, .59000, .50000,

*** SOURCE NUMBER =     9 ***

MASS FRACTION =
 .10000, .40000, .28000, .12000, .06000, .04000,

SETTLING VELOCITY(METERS/SEC) =
  .0010,  .0070,  .0190,  .0370,  .0610,  .0990,

SURFACE REFLECTION COEFFICIENT =
1.00000, .82000, .72000, .65000, .59000, .50000,
```

FIGURE C-10. (Continued)

```
*** --  HYPOTHETICAL POTASH PROCESSING PLANT - DEPOSITION     -- ***

                              *** SOURCE PARTICULATE DATA ***

*** SOURCE NUMBER =    10 ***

MASS FRACTION =
 .10000, .40000, .28000, .12000, .06000, .04000,

SETTLING VELOCITY(METERS/SEC) =
  .0010,  .0070,  .0190,  .0370,  .0610,  .0990,

SURFACE REFLECTION COEFFICIENT =
1.00000, .82000, .72000, .65000, .59000, .50000,

*** SOURCE NUMBER =    11 ***

MASS FRACTION =
 .10000, .40000, .28000, .12000, .06000, .04000,

SETTLING VELOCITY(METERS/SEC) =
  .0010,  .0070,  .0190,  .0370,  .0610,  .0990,

SURFACE REFLECTION COEFFICIENT =
1.00000, .82000, .72000, .65000, .59000, .50000,
```

FIGURE C-10. (Continued)

```
                    *** --  HYPOTHETICAL POTASH PROCESSING PLANT - DEPOSITION     -- ***

                    * SOURCE EMISSION RATE SCALARS WHICH VARY FOR EACH HOUR OF THE DAY *

    HOUR    SCALAR      HOUR    SCALAR      HOUR    SCALAR      HOUR    SCALAR      HOUR    SCALAR      HOUR    SCALAR
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

SOURCE NO.  =     1
       1    .10000+01      2    .10000+01      3    .10000+01      4    .10000+01      5    .10000+01      6    .10000+01
       7    .10000+01      8    .50000+01      9    .50000+01     10    .50000+01     11    .50000+01     12    .50000+01
      13    .50000+01     14    .50000+01     15    .50000+01     16    .10000+01     17    .10000+01     18    .10000+01
      19    .10000+01     20    .10000+01     21    .10000+01     22    .10000+01     23    .10000+01     24    .10000+01
```

FIGURE C-10. (Continued)

APPENDIX D

EXAMPLE EXECUTIONS OF THE ISC LONG-TERM MODEL (ISCLT) COMPUTER PROGRAM

D.1 INTRODUCTION

The following examples are problem runs using the ISC long-term (ISCLT) program to model the hypothetical potash processing plant described in Section 2.6. The examples consist of two executions of the ISCLT program. The first problem is to calculate annual average ground-level particulate concentrations and the second problem is to calculate total annual ground-level deposition. This appendix assumes the user is familiar with the example hypothetical processing plant discussed in Section 2.6 of the main body of the text.

D.2. EXAMPLE CONCENTRATION RUN

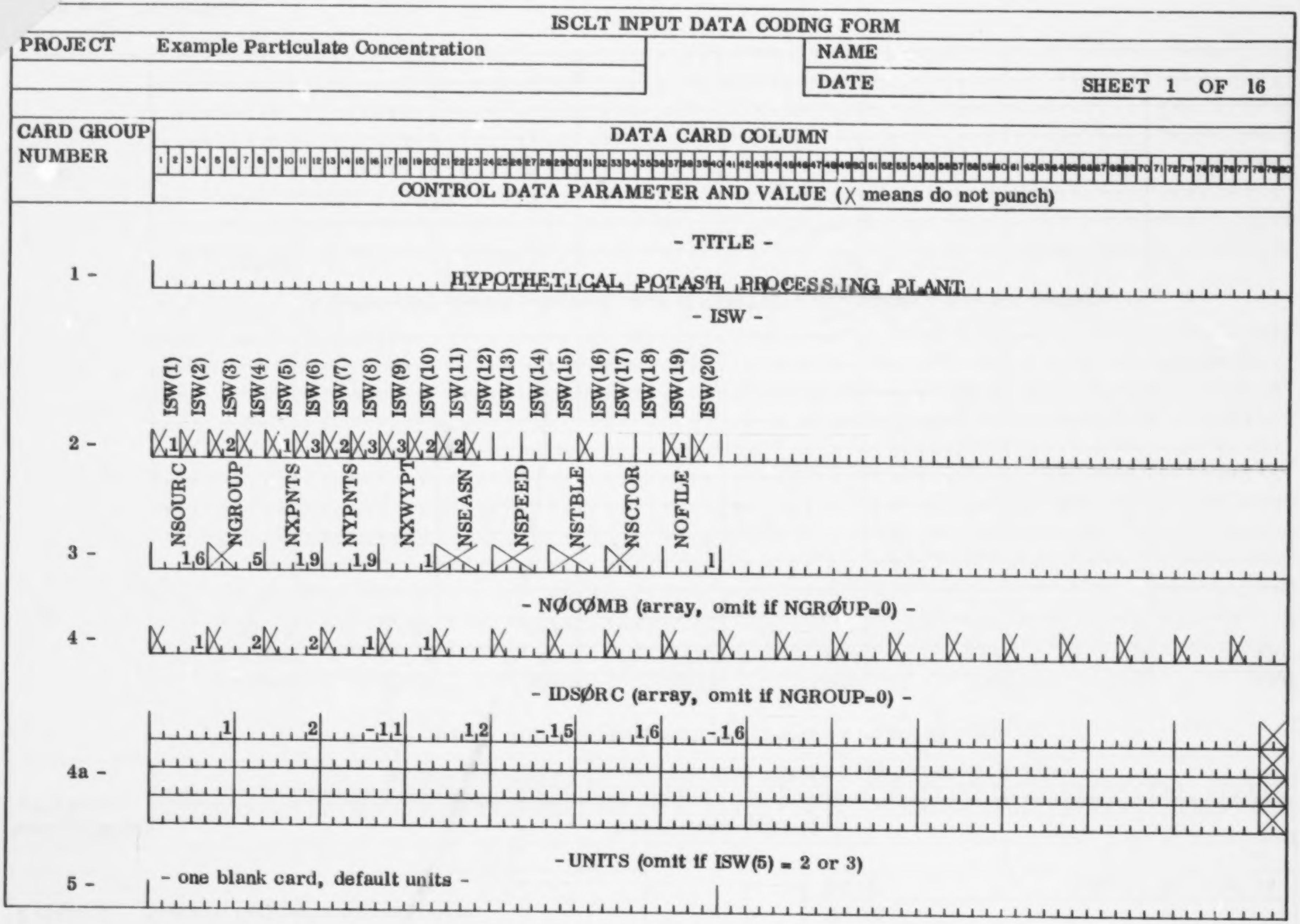
This program example run calculates the annual average ground-level particulate concentrations produced by emissions from the hypothetical potash processing plant described in Section 2.6 and shown in Figure 2-11. The hypothetical plant is modeled as 16 sources: one stack source, fourteen volume sources (roof monitor and conveyor belt) and one area source (ore pile). These sources are placed at the approximate center of the receptor grid system. Because we are only interested in the annual average ground-level particulate concentrations produced by these sources, annual meteorological data are used. The annual meteorological inputs as well as required program control data, run time estimate, and page output estimate are explained in Sections D.2.1. through D.2.3. below.

D.2.1 Input Data Set-Up Procedure

This example run requires the input data shown in the example coding forms in Figure D-1. An explanation of each card group in Figure D-1 is given in Sections D.2.1.a. through D.2.1.m. below.

a. Card Group 1 - Card Group 1 gives the user selected title for the program run. This title is printed at the top of each output page as shown in Figure D-2.

b. Card Group 2 - Card Group 2 selects the program control options desired. This card group shows: ISW(1) equal to "1" for concentration, ISW(3) equal to "2" for discrete receptors in polar coordinates, ISW(5) equal to "1" for an output magnetic tape, ISW(6) equal to "3" for a full printout of the input data, ISW(7) equal to "2" for annual output only, ISW(8) equal to "3" for printing individual as well as combined sources results, ISW(9) equal to "3" for the Rural Mode, ISW(10) equal to "2" for a printout of concentration at all receptors as well as the maximum 10 values, and ISW(11) equal to "2" directing the program to determine the maximum 10 from the combined sources. The receptor grid system used is in Cartesian coordinates; hence, ISW(2) is left blank. Also, ISW(4) is left blank because flat terrain is assumed for the area in the vicinity of the hypothetical potash plant. The parameter ISW(12) is left blank because we are using ISW(11) for the maximum 10 values and the parameters ISW(13) through ISW(18) are left blank because we are using the program default values for these parameters. ISW(13) directs the print output to logical unit 6, ISW(14) is blank because we are not using an input tape and ISW(15) directs the tape output to the magnetic tape on logical unit 3. The default value for ISW(16) directs the program to use the standard print output format rather than compress pages, ISW(17) directs the program to use 57 lines per page, and ISW(18) tells the program that Card Group 9 is not read in this run. ISW(19) directs the program to calculate plume rise as a function of downwind distance because the building wake effects option is to be used for the stack.



ISCLT INPUT DATA CODING FORM

PROJECT Example Particulate Concentration

NAME

DATE SHEET 1 OF 16

CARD GROUP NUMBER

DATA CARD COLUMN

CONTROL DATA PARAMETER AND VALUE (X means do not punch)

- TITLE -

1 - HYPOTHETICAL POTASH PROCESSING PLANT

- ISW -

2 -

ISW(1)	ISW(2)	ISW(3)	ISW(4)	ISW(5)	ISW(6)	ISW(7)	ISW(8)	ISW(9)	ISW(10)	ISW(11)	ISW(12)	ISW(13)	ISW(14)	ISW(15)	ISW(16)	ISW(17)	ISW(18)	ISW(19)	ISW(20)
X 1	X	X 2	X	X 1	X 3	X 2	X 3	X 3	X 2	X 2	X				X			X 1	X

3 -

NSOURC	NGROUP	NXPNTS	NYPNTS	NXWYPT	NSEASN	NSPEED	NSTBLE	NSCTOR	NOFILE
16	X 5	19	19	1	X	X	X	X	1

- NØCØMB (array, omit if NGRØUP=0) -

4 -

X 1	X 2	X 2	X 1	X 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

- IDSØRC (array, omit if NGROUP=0) -

4a -

1	2	-11	12	-15	16	-16						X
												X
												X
												X

-UNITS (omit if ISW(5) = 2 or 3)

5 - - one blank card, default units -

FIGURE D-1. Coding form for the example particulate concentration run.

ISCLT INPUT DATA CODING FORM (Continued)

PROJECT Example Particulate Concentration

NAME

DATE SHEET 2 OF 16

CARD GROUP NUMBER

DATA CARD COLUMN

RECEPTOR DATA PARAMETER AND VALUE (X means do not punch)

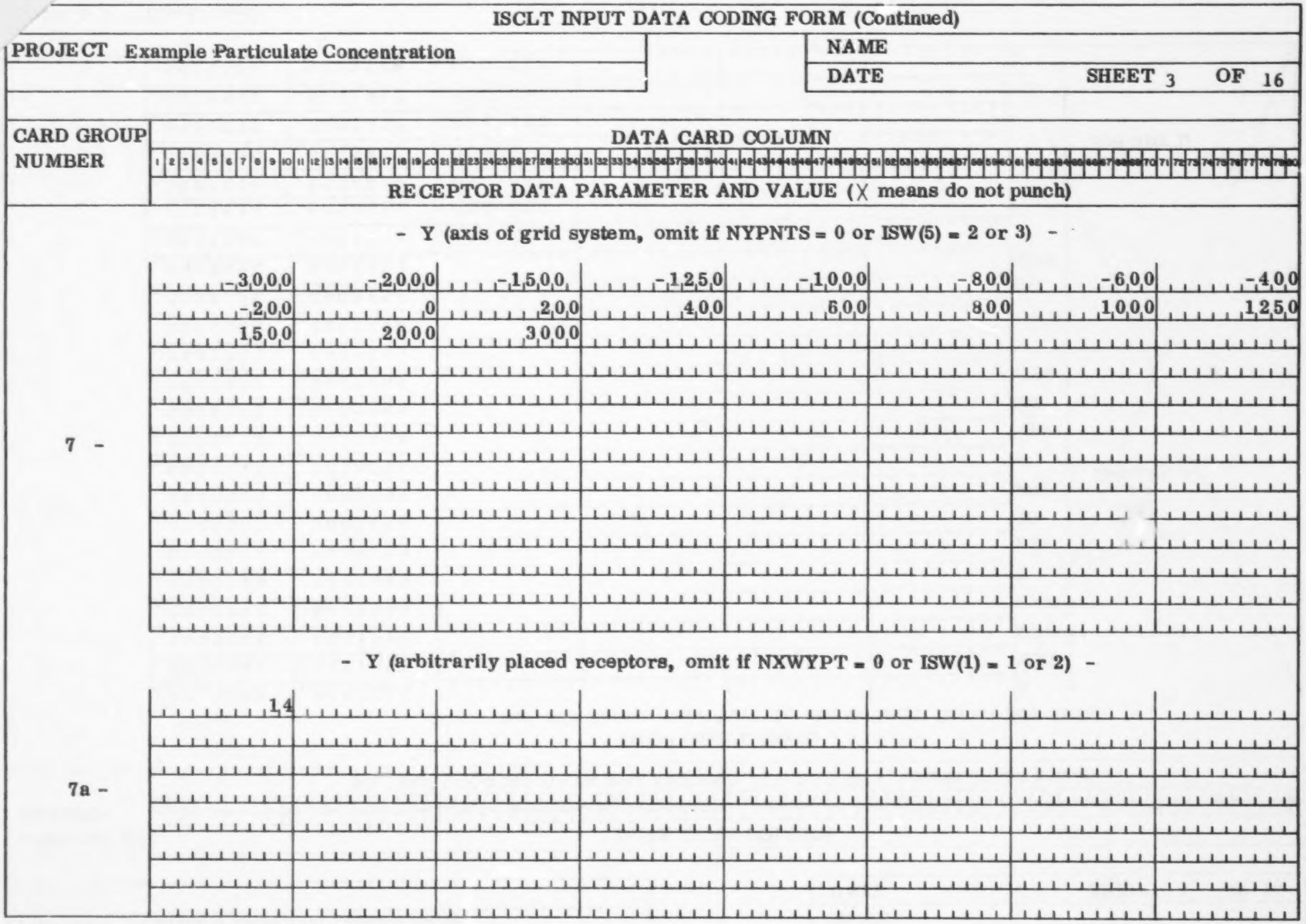
- X (axis of grid system, omit if NXPNTS = 0 or ISW(5) = 2 or 3) -

6 -	-3000	-2000	-1500	-1250	-1000	-800	-600	-400
	-200	0	200	400	600	800	1000	1250
	1500	2000	3000					

- X (arbitrarily placed receptors, omit if NXWYPT = 0 or ISW(5) = 2 or 3 & ISW(12) = 0) -

6a -	2108							

RE D-1. (Continued)



ISCLT INPUT DATA CODING FORM (Continued)

PROJECT Example Particulate Concentration

NAME

DATE SHEET 3 OF 16

CARD GROUP NUMBER

DATA CARD COLUMN

RECEPTOR DATA PARAMETER AND VALUE (X means do not punch)

- Y (axis of grid system, omit if NYPNTS = 0 or ISW(5) = 2 or 3) -

	1–10	11–20	21–30	31–40	41–50	51–60	61–70	71–80
7 -	-3000	-2000	-1500	-1250	-1000	-800	-600	-400
	-200	0	200	400	600	800	1000	1250
	1500	2000	3000					

- Y (arbitrarily placed receptors, omit if NXWYPT = 0 or ISW(1) = 1 or 2) -

	1–10	11–20	21–30	31–40	41–50	51–60	61–70	71–80
7a -	14							

FIGURE D-1. (Continued)

ISCLT INPUT DATA CODING FORM (Continued)

PROJECT Example Particulate Concentration

NAME

DATE SHEET 4 OF 16

CARD GROUP NUMBER

DATA CARD COLUMN

METEORLOGICAL DATA PARAMETER AND VALUE (X means do not punch)

- FREQ (omit if ISW(5) = 2 or 3 -

(Note that the format used here is the default format for FREQ)

CARD GROUP NUMBER								
9 -	.0001695	.0000856					N	Stability A
	.0001283	.0001998					NNE	
	.0000918	.0001998					NE	
	.0001076	.0002569					ENE	
	.0003119	.0005995					E	
	.0003611	.0005139					ESE	
	.0003865	.0003426					SE	
	.0006953	.0007993					SSE	
	.0006747	.0008564					S	
	.0005512	.0005424					SSW	
	.0001441	.0002569					SW	
	.0001155	.0002855					WSW	
	.0002899	.0002569					W	
	.0000839	.0001713					WNW	
	.0000602	.0000856					NW	
	.0002820	.0002284					NNW	
	.0007353	.0007708	.0005710					Stability B
	.0010488	.0010848	.0004853					
	.0004444	.0006851	.0001998					
	.0009629	.0014845	.0008564					
	.0018775	.0027977	.0016843					
	.0016892	.0027977	.0027691					
	.0019770	.0031688	.0034257					

URE D-1. (Continued)

ISCLT INPUT DATA CODING FORM (Continued)

PROJECT Example Particulate Concentration	NAME
	DATE SHEET 5 OF 16

CARD GROUP NUMBER

DATA CARD COLUMN

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80

METEOROLOGICAL DATA PARAMETER AND VALUE (X means do not punch)

- FREQ (Continued) -

CARD GROUP NUMBER							
9 - (Cont.)	.0026238	.0039967	.0042536				Stability B (Cont.)
	.0045918	.0042251	.0028548				
	.0026274	.0030832	.0010563				
	.0014567	.0010848	.0006281				
	.0016527	.0021125	.0007137				
	.0024999	.0021125	.0011134				
	.0013425	.0011990	.0007708				
	.0009151	.0006851	.0004568				
	.0007325	.0007422	.0003711				
	.0004645	.0009421	.0012561	.0001427	.0000285		Stability C
	.0006990	.0007993	.0015130	.0004853	.0001427	.0000285	
	.0002668	.0007422	.0009421	.0004282	.0000285		
	.0005317	.0014559	.0015701	.0004282	.0000571		
	.0006882	.0027977	.0058523	.0007137	.0000856		
	.0006961	.0037683	.0069657	.0021125	.0001427		
	.0005842	.0030546	.0075652	.0031688	.0001713		
	.0006083	.0042536	.0081076	.0025978	.0001998		
	.0011771	.0040823	.0051101	.0006281	.0001142	.0000285	
	.0007716	.0035399	.0024551	.0002569	.0001142	.0000856	
	.0006050	.0016272	.0020269	.0004568	.0000856	.0001427	
	.0008245	.0038539	.0028833	.0005139	.0001713	.0003426	
	.0014135	.0043964	.0059665	.0011134	.0002855	.0003426	
	.0008536	.0021125	.0033972	.0005139	.0002569	.0002284	

FIGURE D-1. (Continued)

ISCLT INPUT DATA CODING FORM (Continued)

PROJECT Example Particulate Concentrations

NAME

DATE **SHEET** 6 **OF** 16

CARD GROUP NUMBER

DATA CARD COLUMN

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80

METEOROLOGICAL DATA PARAMETER AND VALUE (X means do not punch)

- FREQ (Continued) -

9 - (Cont.)	.0003503	.0010563	.0013417	.0001713	.0000571	.0000285	Stability C (Cont.)
	.0006561	.0010563	.0009421	.0001142	.0000571		
	.0009550	.0025978	.0079077	.0136744	.0112764	.0102772	Stability D
	.0006897	.0027406	.0088784	.0134745	.0080790	.0050530	
	.0003984	.0016843	.0065945	.0055383	.0020554	.0005424	
	.0008488	.0040823	.0086214	.0061663	.0011419	.0001998	
	.0019828	.0061949	.0149019	.0124754	.0019412	.0002284	
	.0013385	.0053384	.0166148	.0184133	.0032259	.0004853	
	.0007174	.0035399	.0090782	.0119044	.0017129	.0001908	
	.0009847	.0034257	.0065945	.0070228	.0011990	.0002569	
	.0010097	.0037683	.0046818	.0045105	.0012561	.0006281	
	.0005797	.0029119	.0021411	.0034257	.0013132	.0004853	
	.0004980	.0013703	.0022553	.0034543	.0019983	.0012561	
	.0005598	.0017985	.0050530	.0058808	.0028548	.0020840	
	.0012231	.0045962	.0091353	.0148448	.0079077	.0057667	
	.0006990	.0020269	.0074224	.0141597	.0106198	.0065945	
	.0005355	.0018842	.0051101	.0075937	.0029404	.0019412	
	.0007400	.0021696	.0065374	.0055954	.0026264	.0015987	
		.0052528	.0095064				Stability E
		.0032544	.0070794				
		.0017700	.0057096				
		.0033686	.0075937				
		.0049673	.0097062				

IGURE D-1. (Continued)

ISCLT INPUT DATA CODING FORM (Continued)

PROJECT Example Particulate Concentration

NAME

DATE SHEET 7 OF 16

CARD GROUP NUMBER

DATA CARD COLUMN

METEOROLOGICAL DATA PARAMETER AND VALUE (X means do not punch)

- FREQ (Continued) -

9 - (Cont.)		.0027406	.0056239				X	Stability E (Cont.)
		.0017700	.0027406					
		.0023695	.0018271					
		.0024551	.0015701					
		.0018271	.0013132					
		.0016558	.0019983					
		.0034257	.0055383					
		.0066802	.0111622					
		.0049959	.0070228					
		.0035685	.0063091					
		.0052242	.0089925					
	.0068412	.0097348						Stability F
	.0037307	.0055954						
	.0024779	.0043107						
	.0028384	.0049388						
	.0047532	.0077364						
	.0030647	.0049102						
	.0032044	.0028262						
	.0035623	.0023695						
	.0047073	.0031688						
	.0048615	.0041680						
	.0029674	.0034257						
	.0059074	.0094493						

FIGURE D-1. (Continued)

ISCLT INPUT DATA CODING FORM (Continued)

PROJECT Example Particulate Concentration

NAME

DATE SHEET 8 OF 16

CARD GROUP NUMBER

DATA CARD COLUMN

METEOROLOGICAL DATA PARAMETER AND VALUE (X means do not punch)

- FREQ (Continued) -

9 - (Cont.)	.0117078	.0205544					Stability F (Cont.)
	.0074288	.0120472					
	.0062942	.0098204					
	.0076137	.0128180					

URE D-1. (Continued)

ISCLT INPUT DATA CODING FORM (Continued)

PROJECT Example Particulate Concentration

NAME

DATE SHEET 9 OF 16

CARD GROUP NUMBER

DATA CARD COLUMN

METEOROLOGICAL DATA PARAMETER AND VALUE (X means do not punch)

- TA (omit if ISW(5) = 2 or 3)

10 -	287.2	287.2	283.2	280.8	279.1	279.1	X

- HM (omit if ISW(5) = 2 or 3) -

	1730	1730					Stability A
	1730	1730	1730				Stability B
	960	1025	1235	1295	1295	1295	Stability C
	320	500	840	840	840	840	Stability D
							Stability E
11 -							Stability F

FIGURE D-1. (Continued)

ISCLT INPUT DATA CODING FORM (Continued)

PROJECT Example Particulate Concentration
NAME
DATE SHEET 10 OF 16

CARD GROUP NUMBER

DATA CARD COLUMN

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80

METEOROLOGICAL DATA PARAMETER AND VALUE (X means do not punch)

- HM (Continued) -

11 - (Cont.)

- DPDZ (omit if ISW(5) = 2 or 3) -

12 -
- blank card, use defaults -
- blank card, use defaults -
- blank card, use defaults -
- blank card, use defaults -
- blank card, use defaults -
- blank card, use defaults -

- (omit if ISW(5) = 2 or 3) -

ROTATE TK ZR BETA1 BETA2 G DECAY

13 - - blank card, use defaults -

- UBAR (omit if ISW(5) = 2 or 3) -

14 - - blank card, use defaults -

RE D-1. (Continued)

ISCLT INPUT DATA CODING FORM (Continued)

PROJECT Example Particulate Concentration

NAME

DATE SHEET 11 OF 16

CARD GROUP NUMBER	DATA CARD COLUMN METEOROLOGICAL DATA PARAMETER AND VALUE (X means do not punch)
	- PHI (omit if ISW(5) = 2 or 3) -
15 -	- blank card, use defaults -
	- blank card, use defaults -
	- P (omit if ISW(5) = 2 or 3) -
16 -	- blank card, use defaults -
	- blank card, use defaults -
	- blank card, use defaults -
	- blank card, use defaults -
	- blank card, use defaults -
	- blank card, use defaults -

FIGURE D-1. (Continued)

ISCLT INPUT DATA CODING FORM (Continued)

PROJECT Example Particulate Concentration

NAME

DATE **SHEET 12 OF 16**

CARD GROUP NUMBER

DATA CARD COLUMN 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80

SOURCE DATA PARAMETER AND VALUE

17 -

NUMS	DISP TYPE	QFLG	DX	DY	H	ZS	TS or SIGYO or XO	VEL or SIGZO	D	HB	BW	WAKE	NVS
1	2	3	-13.3	-13.3	10		26.6						6
2	1	3	20	0	.9		4.7	1.0					6
3	1	3	30	0	2.6		4.7	1.0					6
4	1	3	40	0	4.3		4.7	1.0					6
5	1	3	49	0	6.1		4.7	1.0					6
6	1	3	59	0	7.8		4.7	1.0					6
7	1	3	69	0	9.6		4.7	1.0					6
8	1	3	79	0	11.3		4.7	1.0					6
9	1	3	89	0	13.0		4.7	1.0					6
10	1	3	99	0	14.8		4.7	1.0					6
11	1	3	109	0	16.5		4.7	1.0					6
12	1	0	121	0	22.5		10.8	11.6					
13	1	0	144	0	22.5		10.8	11.6					
14	1	0	167	0	22.5		10.8	11.6					
15	1	0	190	0	22.5		10.8	11.6					
16	0	0	201	30	50.0		340	8.0	1.0	25	67		

URE D-1. (Continued)

ISCLT INPUT DATA CODING FORM (Continued)

PROJECT Example Particulate Concentration

NAME

DATE SHEET 13 OF 16

CARD GROUP NUMBER

DATA CARD COLUMN

SOURCE PARAMETER AND VALUE

- VS (omit if NVS = 0) -

17a -

.001	.007	.019	.037	.061	.099		

(Settling velocities for sources 1 through 11, make 11 copies of this card)

FIGURE D-1. (Continued)

ISCLT INPUT DATA CODING FORM (Continued)

PROJECT Example Particulate Concentration

NAME

DATE SHEET 14 OF 16

CARD GROUP NUMBER

DATA CARD COLUMN

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80

SOURCE DATA PARAMETER AND VALUE

17b - - FRQ (omit if NVS = 0) -

.10	.40	.28	.12	.06	.04		

(Mass fractions for sources 1 through 11, make 11 copies of this card)

URE D-1. (Continued)

ISCLT INPUT DATA CODING FORM (Continued)

PROJECT Example Particulate Concentration

NAME

DATE **SHEET** 15 **OF** 16

CARD GROUP NUMBER

DATA CARD COLUMN

SOURCE DATA PARAMETER AND VALUE

17c - - GAMMA (omit if NVS = 0) -

1.0	.82	.72	.65	.59	.50		

(Reflection coefficients for sources 1 through 11, make 11 copies of this card)

FIGURE D-1. (Continued)

ISCLT INPUT DATA CODING FORM (Continued)

PROJECT Example Particulate Concentration

NAME

DATE SHEET 16 OF 16

CARD GROUP NUMBER

DATA CARD COLUMN

SOURCE DATA PARAMETER AND VALUE (X means do not punch)

17d - - Q -

.40	.50					source strengths for source 1
.30	.40	.50				
.20	.30	.40	.50	.70	1.0	
.10	.25	.50	.50	.70	1.0	
	.20	.25				
.05	.10					
.13	.16					source strengths for sources 2 through 11 make 10 copies of each data card
.10	.13	.16				
.08	.12	.14	.16	.19	.22	
.04	.10	.13	.16	.19	.22	
	.08	.10				
.02	.05					
2.63						source strengths for sources 12 through 15 make 4 copies of this card
5						source strength for source 16

RE D-1. (Continued)

c. Card Group 3 - Card Group 3 specifies the number of categories of meteorological data and the number of sources and receptors in the grid system. The parameter NSOURC is set equal to "16" for the 16 sources used to model the hypothetical potash plant. The parameter NGROUP equals "5" because we wish to print the output for five different source groupings. The parameters NXPNTS and NYPNTS are both set equal to "19" for the 19-X by 19-Y receptor grid system shown in Figure 2-3. The parameter NXWYPT is set to "1" and specifies one discrete point that is used in this example to represent an air quality monitor location. The parameters NSEASN through NSCTOR are all left blank so that they assume their respective default values of 1 season, 6 wind-speed categories, 6 stability categories and 16 wind-direction categories. The parameter NOFILE is set equal to "1", because the tape output file will be the first file on tape.

d. Card Groups 4 and 4a - Card Groups 4 and 4a define the source combinations for which concentration output is to be produced. The parameter NGROUP on Card Group 3 specified 5 source combinations. Card Group 4 (NOCOMB) gives the number of source ID-numbers the program is to use to define each source combination. The first output combination has one defining source, the second and third use two defining sources and the fourth and fifth use only one. Card Group 4a shows the actual source ID-numbers the program is to use in each source combination. The program is to output annual concentrations for Source 1, Sources 2 through 11 combined, Sources 12 through 15 combined, Source 16 and all sources (1-16) combined.

e. Card Group 5 - Card Group 5 specifies the output concentration units and input source emission units. Because we wish to use the program default units, this card is left blank. However, this card is still included in the input data deck. The output units are defaulted to "micrograms per cubic meter" and input source emission units are defaulted to "grams per sec" for the stack and volume sources and to "grams per sec per square meter" for the area source as shown in Figure D-2.

f. Card Groups 6, 6a, 7 and 7a - Card Groups 6, 6a, 7 and 7a define the locations of the receptors of the regular (non-discrete) grid system and the discrete point. The regular grid system (Card Groups 6 and 7) is in Cartesian coordinates and the discrete receptor (Card Groups 6a and 7a) is in polar coordinates.

g. Card Groups 8 and 8a - Card Groups 8 and 8a are not shown in Figure D-1 because we are assuming flat terrain (ISW(4) equal to "0"). Thus, the terrain elevation cards are omitted from the input deck.

h. Card Group 9 - Card Group 9 is used to specify an optional format the program uses to read Card Group 9a. Because ISW(18) is left blank (zero), this card group is not used by the program and is omitted from the input deck. The program will use the default FORTRAN format of (6F10.0) to read the data shown in Card Group 9a. This default format requires the user to punch the frequency of occurrence data in Card Group 9a using 10 columns per value including the decimal point (period). Only NSPEED values are read per data card in Card Group 9a.

i. Card Group 9a - Card Group 9a gives the joint frequency of occurrence of wind speed and direction by stability category and season. As the example run is using annual data, only one season (annual) is punched. Within this one season, there are six stability categories (A through F) and within each stability category there are sixteen cards, one for each wind direction category clockwise from north to north-northwest. Each data card contains the frequency of occurrence for the six wind-speed categories. Values that are zero have been left blank because the ISCLT program interprets blanks as zeroes. If we were using seasonal data in the example problem, the program would require NSEASN decks punched as in Figure D-1.

j. Card Group 10 - Card Group 10 gives the annual ambient air temperatures in degrees Kelvin for stability categories A through F.

k. Card Group 11 - Card Group 11 gives the annual mixing heights in meters by stability and wind speed. The mixing heights are punched, six values per card, for wind-speed categories 1 through 6, and there are six cards for stability categories A through F. If we were using seasonal data in this example run, the program would require NSEASN groups of these data cards. For the purpose of this example, it is assumed that the median mixing heights shown in Figure D-1 have been developed as a function of wind speed and stability using onsite acoustic radar data. Some values have been left blank in this card group in Figure D-1 for stability categories A through D because the joint frequency of occurrence of these wind-speed and stability categories is zero (and no calculations will take place). The values for stability categories E and F have been left blank because the case is being run in the Rural Mode and the program automatically uses 10,000 meters. Note also that the decimal point is not punched. The decimal point can be eliminated in real variables only when the value is a whole number and right justified in the respective punch columns.

l. Card Groups 12 through 16 - Card Groups 12 through 16 provide the remaining meteorological and model data. These card groups are all blank, but must be included in the input data deck. The program provides default values for all of these data items and their respective values are shown in Figure D-2 under the "ISCLT INPUT DATA" heading.

m. Card Groups 17 through 17d - Card Groups 17 through 17d provide all of the source information. Figure D-1 shows each of these card groups on a separate page. The coding forms are set-up in the manner shown to facilitate key-punching. *However, this is not the correct order for input to the program.* These data cards must be reordered so that there are Card Groups 17, 17a, 17b, 17c and 17d for Source 1, 17 through 17d for Source 2, etc. prior to input to the program. Card Group 17 in Figure D-1 shows Sources 1 through 16. The parameter DISP is blank (zero) for each source as this run is the initial entry of these sources and there is no input tape. The parameter TYPE identifies the type of source ("0" = stack, "1" = volume, "2" = area) and QFLG specifies how the source emissions vary. The emissions from Sources 1 through 11 vary with wind-speed category and stability category, while the emissions from Sources 12 through 16 are assumed constant. Card Group 17 also gives the location, height, exit temperature, and exit velocity or dimensions (depending on the source type), inner diameter of the stack, and the height and width of the building for the consideration of wake effects for stack emissions. As we are calculating particulate concentrations, the parameter NVS has been set to the number (6) of particulate size categories used to define the particulate distributions of Sources 1 through 11. However, the particulate emissions from Sources 12 through 16 are assumed to have negligible gravitational settling velocities and are treated as gaseous emissions. Card Groups 17a, 17b and 17c specify the particulate settling velocity (VS), mass fraction of the distribution (FRQ), and the surface reflection coefficient for each of the six particulate size categories for Sources 1 through 11. Note that Card Groups 17a through 17c are omitted for Sources 12 through 16 because NVS on Card Group 17 for these sources is blank (zero). Card Group 17d in Figure D-1 shows the emissions of each of the input sources. The first six cards of this group specify the emissions of Source 1. There is one card for each stability category with six values across the card for the wind-speed categories. If we were using seasonal data in this example, the program would require NSEASN groups of these cards for Source 1 because QFLG for this source is set to "3". Data cards 7 through 12 of this card group specify the source emissions for Sources 2 through 11 in the same manner as for Source 1. Sources 2 through 11 have the same emissions and hence only one copy of this set of cards is coded with instructions to make ten copies of these six cards. The last two cards punched specify the emissions for Sources 12 through 16 on an annual (non-varying) basis. In some cases, the source emissions are blank on these data cards because the frequency of occurrence of wind speed and wind direction is zero. The input deck for these sources will include one card from Card Groups 17 through 17c and six cards of Card Group 17d for Sources 1 through 11. Following these cards, the deck will include one card from Card Group 17 and one from Card Group 17d for Sources 12 through 16 for a total of 120 cards in the input source data deck.

D.2.2 Run Time, Required Data Storage, Page Output and Tape Output Estimates.

The run time, data storage, page output and tape output estimate calculated for the example concentration run are given in the following paragraphs.

a. Run Time - The run time estimate is calculated using Equation (4-6) in Section 4.2.5 and is approximated by

$$\text{Time (seconds)} = \text{NSOURC} \cdot (\text{NXPNTS} \cdot \text{NYPNTS} + \text{NXWYPT}) \cdot \text{NSEASN} \cdot \text{NSTBLE} \cdot \text{NSPEED} \cdot (\text{NVS}+1) \cdot 7 \times 10^{-4} \qquad \text{(D-1)}$$

Substituting values from Figure D-1,

$$\text{Time (seconds)} \simeq 16 \cdot (19 \cdot 19+1) \cdot 1 \cdot 6 \cdot 6 \cdot 7 \cdot 7\text{x}10^{-4} \simeq 1022 \qquad \text{(D-2)}$$

or approximately 17 minutes estimated run time for the example problem. The actual run time was 8 minutes. The value of f $(7\text{x}10^{-4})$ used in this approximation is calculated to over predict the actual run time to insure that the ISCLT program does not max-time.

b. Required Data Storage - The required data storage must be calculated to determine whether or not the desired run will fit in the ISCLT program. First, the amount of data storage required by a particular run is determined by Equation (4-3) in Section 4.1.2. Second, if the user desires maximum 10 calculations under ISW(11) (ISW(11) = "2") or if the parameter NGROUP is set to a value greater than "0", the user must comply with Condition a, b or c under ISW(11) or under NGROUP in Section 4.1.2.

Taking values from Figure D-1 and substituting in Equation (4-3) we calculate

$$40000 \geq \left[19+19+2\cdot 1\right] + (2\cdot 16+0) \cdot (19\cdot 19+1) \qquad \text{(D-3)}$$
$$\geq 11947$$

Where the variables K and I in Equation (4-3) are set to "2" and "0", respectively. The value of K is set to "2" because ISW(8) has a value of "3" and I is set to "0" because ISW(4) has a value of "0". We see from the calculated inequality that we are well within the program storage limitations and have complied with the first part of the data storage check. The second part of the required data storage check must be done only if ISW(11) is set to a value of "2" or the parameter NGROUP is set to a value greater than "0". If either of these parameters are set as indicated, the program is required to save the individual source concentration (deposition) calculations for multiple passes through these data. The program must save these calculations on either magnetic tape (mass storage) or in the program storage area. Conditions a and b under ISW(11) and NGROUP in Section 4.1.2 require either an input tape or output tape. Condition c under ISW(11) or NGROUP in Section 4.1.2 requires the user to evaluate Equation (4-1) or Equation (4-2) if Conditions a or b are not complied with. The example run shown in Figure D-1 shows we are using an output tape (ISW(5) = "1") and hence we have complied with Condition b and satisfied the second part of the data storage check. However, the parameter NOFILE must be input on Card Group 3 when applying Condition b.

c. Page Output - The page output estimate is calculated using Equation (4-8) in Section 4.2.5 giving the output pages as

$$\text{Pages} = A + B + C \qquad \text{(D-4)}$$

The value of A from Equation (4-9) is $16+N_s$ or 16+16=32, because we are using 16 input sources and ISW(4) equals "0". The value of B, obtained from Equation (4-10), is given by

$$\begin{aligned} B &\approx 1 \cdot (16+3) \cdot \left(\left[\frac{\frac{19}{9} \cdot (19+11)}{57} \right] + \left[\frac{1}{3 \cdot (57-11)} \right] + 1 \right) \\ &\approx 19 \cdot (2 + 1 + 1) \qquad \text{(D-5)} \\ &\approx 76 \end{aligned}$$

The variable I in Equation (4-10) is set to "1", because we are printing only annual tables. The variables N_i and N_c are set to "16" and "3", respectively. N_i is "16" because ISW(8) is set to "3", specifying individual source output, and there are 16 source ID-numbers implicitly or explicitly defined in IDSORC in Card Group 4a of Figure D-1. The variables N_x, N_y and N_{xy} have been set to "19", "19" and "1", respectively, defining the total number of receptor points. Also, the variable N_ℓ is 57 lines per page. The symbols [ ] in Equation (4-10) indicate to round up to the next larger integer if there is any fractional part. We should also add an additional 16 pages to B because maximum 10 calculations are being made and the program will print tables of the maximum 10 contributions of each individual source to the combined sources maximum 10. The total estimated output pages is then given by

$$\begin{aligned} \text{pages} &\approx 32 + 92 + 5 \\ &\approx 129 \end{aligned} \qquad \text{(D-6)}$$

The actual number of pages output was 93, with 6 pages of system generated paper and 87 pages produced by the example concentration run.

d. Tape Output - The amount of space required on a magnetic tape or data file is calculated using Equations (4-11) and (4-12) in Section 4.2.5. The number of computer words written by the program is exact and is calculated by substituting values from Figure D-1 into Equation (4-11), giving

$$\text{Words} = \Big(0+2645+19+19+(2 \cdot 1)+\big(16 \cdot (220+1 \cdot (19 \cdot 19+2))\big)\Big) \tag{D-7}$$
$$= 12013$$

where the variable Ns in Equation (4-11) is set to the total number of sources ("16") output to tape and the variable I is "0" because ISW(4) equals "0". If the output data are being written to a mass storage file, the user assigns the number of mass storage tracks that will contain 12013 or more words of information. However, if the data are to be output to magnetic tape, Equation (4-12) in Section 4.2.5 is evaluated to make certain the output data will fit on the magnetic tape. Equation (4-12) requires the number of words to be output (12013), the tape recording density (D), the number of bits per computer word (B), the number of words per physical FORTRAN unformatted tape block (B_ℓ) and whether the output tape is seven or nine track (B_y). This information if not known can be obtained from the programming and/or systems consultant for your computer installation. Because this example problem was run on a UNIVAC 1108 computer using a nine-track output tape recorded at 800 bpi, the following values were used in Equation (4-12):

$B = 36$ (bits per word)
$D = 800$ (recording density)
$B_\ell = 224$ (block length in words for unformatted Fortran tape records)
$B_y = 8$ (9-track tape)

giving

$$\text{length (feet)} \approx \left[\left(\frac{12013 \cdot 36}{8 \cdot 800}\right) + 0.75\left(\frac{12013}{224}\right) + 6\right] / 12.0 \tag{D-8}$$
$$\approx 9.5$$

or approximately 9.5 feet of tape used. The length of tape required for most runs will be well short of a standard 2400-foot reel and the user need approximate this quantity only when processing very large runs or when writing multiple cases (multiple files) to the tape. For example, we would have required approximately 5772 sources in this example run to fill a full 2400-foot tape reel.

D.2.3 Example Print Output.

Figure D-2 illustrates the printed concentration output for the example hypothetical potash plant. The listing begins by printing the input data under the heading "ISCLT INPUT DATA". This part of the output listing includes all punched data and default values, except source data. Next, the source data are listed under the heading "SOURCE INPUT DATA". Note that the source input data listing also contains warning messages indicating a source is too close to a receptor. Concentrations are not calculated for the indicated source-receptor combinations. The remainder of the output listing in Figure D-2 shows the annual ground-level particulate concentrations due to selected sources, but does not show the complete output listing. The page number of each table in the output listing is shown in the upper right hand corner. For example, pages 13, 14 and 15 (upper right hand corner) show the complete output for Source 1. The heading given is "ANNUAL GROUND LEVEL CONCENTRATION (MICROGRAMS PER CUBIC METER) DUE TO SOURCE 1". The particulate concentrations calculated for the receptor grid system follow the page heading on page 13 and end at the middle of page 14. The concentrations at the discrete receptors are then printed, followed by the maximum 10 values. The maximum 10 values listed here were derived from Source 1 alone as there were no other sources in this particular source combination. The next concentration tables illustrated are from pages 16 through 18 of the output listing. These pages give the individual concentrations produced by Source 2 that contribute to the combined Sources 2 through 11. The individual source output is printed because ISW(8) was input as "3". Note that the maximum 10 values for Source 2 on page 17 are actually those 10 receptors from Source 2 that contribute to the maximum 10 values of the combined Sources 2 through 11. Although not shown in Figure D-2, the output listing continues printing tables for Sources 3 through 11 with the same form and content as shown for Source 2 on pages 16 through 18. The next concentration tables illustrated

```
**** ISCLT *************               HYPOTHETICAL POTASH PROCESSING PLANT                               ******** PAGE     1 ****

                                             - ISCLT INPUT DATA -

        NUMBER OF SOURCES =  16
        NUMBER OF X AXIS GRID SYSTEM POINTS =   19
        NUMBER OF Y AXIS GRID SYSTEM POINTS =   19
        NUMBER OF SPECIAL POINTS =    1
        NUMBER OF SEASONS =   1
        NUMBER OF WIND SPEED CLASSES =   6
        NUMBER OF STABILITY CLASSES =   6
        NUMBER OF WIND DIRECTION CLASSES =  16
        FILE NUMBER OF DATA FILE USED FOR REPORTS =   1
        THE PROGRAM IS RUN IN RURAL MODE
        CONCENTRATION (DEPOSITION) UNITS CONVERSION FACTOR =    10000000+07
        ACCELERATION OF GRAVITY (METERS/SEC**2) =  9.800
        HEIGHT OF MEASUREMENT OF WIND SPEED (METERS) =  10.000
        ENTRAINMENT PARAMETER FOR UNSTABLE CONDITIONS =  .600
        ENTRAINMENT PARAMETER FOR STABLE CONDITIONS =  .600
        CORRECTION ANGLE FOR GRID SYSTEM VERSUS DIRECTION DATA NORTH (DEGREES) =     .000
        DECAY COEFFICIENT =  .00000000
        PROGRAM OPTION SWITCHES = 1, 1, 2, 0, 1, 3, 2, 3, 3, 2, 2, 0, 0, 0, 0, 0, 0, 0, 1, 0,
        SOURCES USED TO FORM SOURCE COMBINATION  1 ARE -      1,
        SOURCES USED TO FORM SOURCE COMBINATION  2 ARE -      2,    -11,
        SOURCES USED TO FORM SOURCE COMBINATION  3 ARE -     12,    -15,
        SOURCES USED TO FORM SOURCE COMBINATION  4 ARE -     16,
        SOURCES USED TO FORM SOURCE COMBINATION  5 ARE -    -16,
      DISTANCE X AXIS GRID SYSTEM POINTS (METERS )=   -3000.00,   -2000.00,   -1500.00,   -1250.00,   -1000.00,    -800.00,
           -600.00,    -400.00,    -200.00,         .00,       200.00,      400.00,      600.00,      800.00,     1000.00,    1250.00,
           1500.00,    2000.00,    3000.00,
         RANGE X SPECIAL DISCRETE POINTS (METERS )=    2108.00,
      DISTANCE Y AXIS GRID SYSTEM POINTS (METERS )=   -3000.00,   -2000.00,   -1500.00,   -1250.00,   -1000.00,    -800.00,
           -600.00,    -400.00,    -200.00,         .00,       200.00,      400.00,      600.00,      800.00,     1000.00,    1250.00,
           1500.00,    2000.00,    3000.00,
   AZIMUTH BEARING Y SPECIAL DISCRETE POINTS (DEGREES)=       14.00,
                                - AMBIENT AIR TEMPERATURE (DEGREES KELVIN) -

                   STABILITY  STABILITY  STABILITY  STABILITY  STABILITY  STABILITY
                   CATEGORY 1 CATEGORY 2 CATEGORY 3 CATEGORY 4 CATEGORY 5 CATEGORY 6
        SEASON  1   287.2000   287.2000   283.2000   280.8000   279.1000   279.1000
                                       - MIXING LAYER HEIGHT (METERS) -

                                                 SEASON 1
                         WIND SPEED  WIND SPEED  WIND SPEED  WIND SPEED  WIND SPEED  WIND SPEED
                         CATEGORY 1  CATEGORY 2  CATEGORY 3  CATEGORY 4  CATEGORY 5  CATEGORY 6
  STABILITY CATEGORY 1   .173000+04  .173000+04  .173000+04  .173000+04  .173000+04  .173000+04
  STABILITY CATEGORY 2   .173000+04  .173000+04  .173000+04  .173000+04  .173000+04  .173000+04
  STABILITY CATEGORY 3   .960000+03  .102500+04  .123500+04  .129500+04  .129500+04  .129500+04
  STABILITY CATEGORY 4   .320000+03  .500000+03  .840000+03  .840000+03  .840000+03  .840000+03
  STABILITY CATEGORY 5   .100000+05  .100000+05  .100000+05  .100000+05  .100000+05  .100000+05
  STABILITY CATEGORY 6   .100000+05  .100000+05  .100000+05  .100000+05  .100000+05  .100000+05
```

FIGURE D-2. Annual Average Ground-Level Particulate Concentration Output Listing.

```
**** ISCLT *************                 HYPOTHETICAL POTASH PROCESSING PLANT                                 ******** PAGE      2 ****

                                                  - ISCLT INPUT DATA (CONT.) -

                            - FREQUENCY OF OCCURRENCE OF WIND SPEED, DIRECTION AND STABILITY -
                                                          SEASON 1
                                                    STABILITY CATEGORY 1

                     WIND SPEED  WIND SPEED  WIND SPEED  WIND SPEED  WIND SPEED  WIND SPEED
                     CATEGORY 1  CATEGORY 2  CATEGORY 3  CATEGORY 4  CATEGORY 5  CATEGORY 6
      DIRECTION    (   .7500MPS)( 2.5000MPS)( 4.3000MPS)( 6.8000MPS)( 9.5000MPS)(12.5000MPS)
      (DEGREES)
            .000      .00016950   .00008560   .00000000   .00000000   .00000000   .00000000
          22.500      .00012830   .00019980   .00000000   .00000000   .00000000   .00000000
          45.000      .00009180   .00019980   .00000000   .00000000   .00000000   .00000000
          67.500      .00010760   .00025690   .00000000   .00000000   .00000000   .00000000
          90.000      .00031190   .00059950   .00000000   .00000000   .00000000   .00000000
         112.500      .00036110   .00051390   .00000000   .00000000   .00000000   .00000000
         135.000      .00038650   .00034260   .00000000   .00000000   .00000000   .00000000
         157.500      .00069530   .00079930   .00000000   .00000000   .00000000   .00000000
         180.000      .00067470   .00085640   .00000000   .00000000   .00000000   .00000000
         202.500      .00055120   .00054240   .00000000   .00000000   .00000000   .00000000
         225.000      .00014410   .00025690   .00000000   .00000000   .00000000   .00000000
         247.500      .00011550   .00028550   .00000000   .00000000   .00000000   .00000000
         270.000      .00028990   .00025690   .00000000   .00000000   .00000000   .00000000
         292.500      .00008390   .00017130   .00000000   .00000000   .00000000   .00000000
         315.000      .00006020   .00008560   .00000000   .00000000   .00000000   .00000000
         337.500      .00028200   .00022840   .00000000   .00000000   .00000000   .00000000
                                                          SEASON 1
                                                    STABILITY CATEGORY 2

                     WIND SPEED  WIND SPEED  WIND SPEED  WIND SPEED  WIND SPEED  WIND SPEED
                     CATEGORY 1  CATEGORY 2  CATEGORY 3  CATEGORY 4  CATEGORY 5  CATEGORY 6
      DIRECTION    (   .7500MPS)( 2.5000MPS)( 4.3000MPS)( 6.8000MPS)( 9.5000MPS)(12.5000MPS)
      (DEGREES)
            .000      .00073530   .00077080   .00057100   .00000000   .00000000   .00000000
          22.500      .00104880   .00108480   .00048530   .00000000   .00000000   .00000000
          45.000      .00044440   .00068510   .00019980   .00000000   .00000000   .00000000
          67.500      .00096290   .00148450   .00085640   .00000000   .00000000   .00000000
          90.000      .00187750   .00279770   .00168430   .00000000   .00000000   .00000000
         112.500      .00168920   .00279770   .00276910   .00000000   .00000000   .00000000
         135.000      .00197700   .00316880   .00342570   .00000000   .00000000   .00000000
         157.500      .00262380   .00399670   .00425361   .00000000   .00000000   .00000000
         180.000      .00459181   .00422511   .00285480   .00000000   .00000000   .00000000
         202.500      .00262740   .00308320   .00105630   .00000000   .00000000   .00000000
         225.000      .00145670   .00108480   .00062810   .00000000   .00000000   .00000000
         247.500      .00165270   .00211250   .00071370   .00000000   .00000000   .00000000
         270.000      .00249990   .00211250   .00111340   .00000000   .00000000   .00000000
         292.500      .00134250   .00119900   .00077080   .00000000   .00000000   .00000000
         315.000      .00091510   .00068510   .00045680   .00000000   .00000000   .00000000
         337.500      .00073250   .00074220   .00037110   .00000000   .00000000   .00000000
```

FIGURE D-2. (Continued)

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**** ISCLT *************                HYPOTHETICAL POTASH PROCESSING PLANT                          ******** PAGE     3 ****

                                          - ISCLT INPUT DATA (CONT.) -

                          - FREQUENCY OF OCCURRENCE OF WIND SPEED, DIRECTION AND STABILITY -
                                                   SEASON 1
                                            STABILITY CATEGORY 3

                 WIND SPEED   WIND SPEED   WIND SPEED   WIND SPEED   WIND SPEED   WIND SPEED
                 CATEGORY 1   CATEGORY 2   CATEGORY 3   CATEGORY 4   CATEGORY 5   CATEGORY 6
   DIRECTION    (   .7500MPS)( 2.5000MPS)( 4.3000MPS)( 6.8000MPS)( 9.5000MPS)(12.5000MPS)
  (DEGREES)
        .000      .00046450    .00094210    .00125610    .00014270    .00002850    .00000000
      22.500      .00069900    .00079930    .00151300    .00048530    .00014270    .00002850
      45.000      .00026680    .00074220    .00094210    .00042820    .00002850    .00000000
      67.500      .00053170    .00145590    .00157010    .00042820    .00005710    .00000000
      90.000      .00068820    .00279770    .00585231    .00071370    .00008560    .00000000
     112.500      .00069610    .00376830    .00696571    .00211250    .00014270    .00000000
     135.000      .00058420    .00305460    .00756521    .00316080    .00017130    .00000000
     157.500      .00060830    .00425361    .00810761    .00259780    .00019980    .00000000
     180.000      .00117710    .00408231    .00511011    .00062010    .00011420    .00002850
     202.500      .00077160    .00353990    .00245510    .00025690    .00011420    .00008560
     225.000      .00060500    .00162720    .00202690    .00045680    .00008560    .00014270
     247.500      .00082450    .00385390    .00288330    .00051390    .00017130    .00034260
     270.000      .00141350    .00439641    .00596651    .00111340    .00028550    .00034260
     292.500      .00085360    .00211250    .00339720    .00051390    .00025690    .00022840
     315.000      .00035030    .00105630    .00134170    .00017130    .00005710    .00002850
     337.500      .00065610    .00105630    .00094210    .00011420    .00005710    .00000000
                                                   SEASON 1
                                            STABILITY CATEGORY 4

                 WIND SPEED   WIND SPEED   WIND SPEED   WIND SPEED   WIND SPEED   WIND SPEED
                 CATEGORY 1   CATEGORY 2   CATEGORY 3   CATEGORY 4   CATEGORY 5   CATEGORY 6
   DIRECTION    (   .7500MPS)( 2.5000MPS)( 4.3000MPS)( 6.8000MPS)( 9.5000MPS)(12.5000MPS)
  (DEGREES)
        .000      .00095500    .00259780    .00790771    .01367442    .01127641    .01027721
      22.500      .00068970    .00274060    .00887841    .01347452    .00807901    .00505301
      45.000      .00039840    .00168430    .00659451    .00553831    .00205540    .00054240
      67.500      .00084880    .00408231    .00862141    .00616631    .00114190    .00019980
      90.000      .00198280    .00619491    .01490192    .01247542    .00194120    .00022840
     112.500      .00133850    .00533841    .01661482    .01841332    .00322590    .00048530
     135.000      .00071740    .00353990    .00907821    .01190441    .00171290    .00019980
     157.500      .00098470    .00342570    .00659451    .00702281    .00119900    .00025690
     180.000      .00100970    .00376830    .00468181    .00451051    .00125610    .00062810
     202.500      .00057970    .00291190    .00214110    .00342570    .00131320    .00048530
     225.000      .00049800    .00137030    .00225530    .00345430    .00199830    .00125610
     247.500      .00055980    .00179850    .00505301    .00588081    .00285480    .00208400
     270.000      .00122310    .00459621    .00913531    .01484482    .00790771    .00576671
     292.500      .00069900    .00202690    .00742241    .01415972    .01061981    .00659451
     315.000      .00053550    .00188420    .00511011    .00759371    .00294040    .00194120
     337.500      .00074000    .00216960    .00653741    .00559541    .00262640    .00159870
```

FIGURE D-2. (Continued)

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**** ISCLT *************                HYPOTHETICAL POTASH PROCESSING PLANT                              ******** PAGE     4 ****

                                              - ISCLT INPUT DATA (CONT.) -

                              - FREQUENCY OF OCCURRENCE OF WIND SPEED, DIRECTION AND STABILITY -
                                                      SEASON 1
                                                STABILITY CATEGORY 5

                  WIND SPEED   WIND SPEED   WIND SPEED   WIND SPEED   WIND SPEED   WIND SPEED
                  CATEGORY 1   CATEGORY 2   CATEGORY 3   CATEGORY 4   CATEGORY 5   CATEGORY 6
 DIRECTION      (   .7500MPS)( 2.5000MPS)( 4.3000MPS)( 6.8000MPS)( 9.5000MPS)(12.5000MPS)
(DEGREES)
      .000        .00000000    .00525281    .00950641    .00000000    .00000000    .00000000
    22.500        .00000000    .00325440    .00767941    .00000000    .00000000    .00000000
    45.000        .00000000    .00177000    .00570961    .00000000    .00000000    .00000000
    67.500        .00000000    .00336860    .00759371    .00000000    .00000000    .00000000
    90.000        .00000000    .00496731    .00970621    .00000000    .00000000    .00000000
   112.500        .00000000    .00274060    .00562391    .00000000    .00000000    .00000000
   135.000        .00000000    .00177000    .00274060    .00000000    .00000000    .00000000
   157.500        .00000000    .00236950    .00182710    .00000000    .00000000    .00000000
   180.000        .00000000    .00245510    .00157010    .00000000    .00000000    .00000000
   202.500        .00000000    .00182710    .00131320    .00000000    .00000000    .00000000
   225.000        .00000000    .00165580    .00199830    .00000000    .00000000    .00000000
   247.500        .00000000    .00342570    .00553831    .00000000    .00000000    .00000000
   270.000        .00000000    .00668021    .01116221    .00000000    .00000000    .00000000
   292.500        .00000000    .00499391    .00702281    .00000000    .00000000    .00000000
   315.000        .00000000    .00356850    .00630911    .00000000    .00000000    .00000000
   337.500        .00000000    .00522421    .00899251    .00000000    .00000000    .00000000
                                                      SEASON 1
                                                STABILITY CATEGORY 6

                  WIND SPEED   WIND SPEED   WIND SPEED   WIND SPEED   WIND SPEED   WIND SPEED
                  CATEGORY 1   CATEGORY 2   CATEGORY 3   CATEGORY 4   CATEGORY 5   CATEGORY 6
 DIRECTION      (   .7500MPS)( 2.5000MPS)( 4.3000MPS)( 6.8000MPS)( 9.5000MPS)(12.5000MPS)
(DEGREES)
      .000        .00684121    .00973481    .00000000    .00000000    .00000000    .00000000
    22.500        .00373070    .00559541    .00000000    .00000000    .00000000    .00000000
    45.000        .00247790    .00431071    .00000000    .00000000    .00000000    .00000000
    67.500        .00283840    .00493881    .00000000    .00000000    .00000000    .00000000
    90.000        .00475321    .00773641    .00000000    .00000000    .00000000    .00000000
   112.500        .00306470    .00491021    .00000000    .00000000    .00000000    .00000000
   135.000        .00320440    .00282620    .00000000    .00000000    .00000000    .00000000
   157.500        .00356230    .00236950    .00000000    .00000000    .00000000    .00000000
   180.000        .00470731    .00316880    .00000000    .00000000    .00000000    .00000000
   202.500        .00436151    .00416801    .00000000    .00000000    .00000000    .00000000
   225.000        .00296740    .00342570    .00000000    .00000000    .00000000    .00000000
   247.500        .00590741    .00944931    .00000000    .00000000    .00000000    .00000000
   270.000        .01170781    .02053443    .00000000    .00000000    .00000000    .00000000
   292.500        .00742881    .01204721    .00000000    .00000000    .00000000    .00000000
   315.000        .00629121    .00982041    .00000000    .00000000    .00000000    .00000000
   337.500        .00761371    .01281802    .00000000    .00000000    .00000000    .00000000
```

FIGURE D-2. (Continued)

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**** ISCLT *************                HYPOTHETICAL POTASH PROCESSING PLANT                                  ******** PAGE     5 ****

                                              - ISCLT INPUT DATA (CONT.) -

                              - VERTICAL POTENTIAL TEMPERATURE GRADIENT (DEGREES KELVIN/METER) -

                          WIND SPEED   WIND SPEED   WIND SPEED   WIND SPEED   WIND SPEED   WIND SPEED
                          CATEGORY 1   CATEGORY 2   CATEGORY 3   CATEGORY 4   CATEGORY 5   CATEGORY 6
STABILITY CATEGORY 1      .000000      .000000      .000000      .000000      .000000      .000000
STABILITY CATEGORY 2      .000000      .000000      .000000      .000000      .000000      .000000
STABILITY CATEGORY 3      .000000      .000000      .000000      .000000      .000000      .000000
STABILITY CATEGORY 4      .000000      .000000      .000000      .000000      .000000      .000000
STABILITY CATEGORY 5      .200000-01   .200000-01   .200000-01   .200000-01   .200000-01   .200000-01
STABILITY CATEGORY 6      .350000-01   .350000-01   .350000-01   .350000-01   .350000-01   .350000-01
                                          - WIND PROFILE POWER LAW EXPONENTS -

                          WIND SPEED   WIND SPEED   WIND SPEED   WIND SPEED   WIND SPEED   WIND SPEED
                          CATEGORY 1   CATEGORY 2   CATEGORY 3   CATEGORY 4   CATEGORY 5   CATEGORY 6
STABILITY CATEGORY 1      .100000+00   .100000+00   .100000+00   .100000+00   .100000+00   .100000+00
STABILITY CATEGORY 2      .150000+00   .150000+00   .150000+00   .150000+00   .150000+00   .150000+00
STABILITY CATEGORY 3      .200000+00   .200000+00   .200000+00   .200000+00   .200000+00   .200000+00
STABILITY CATEGORY 4      .250000+00   .250000+00   .250000+00   .250000+00   .250000+00   .250000+00
STABILITY CATEGORY 5      .300000+00   .300000+00   .300000+00   .300000+00   .300000+00   .300000+00
STABILITY CATEGORY 6      .300000+00   .300000+00   .300000+00   .300000+00   .300000+00   .300000+00
```

FIGURE D-2. (Continued)

```
**** ISCLT *************                    HYPOTHETICAL POTASH PROCESSING PLANT                         ******** PAGE      6 ****

                                                 - SOURCE INPUT DATA -

C T SOURCE SOURCE      X            Y       EMISSION  BASE /
A A NUMBER  TYPE  COORDINATE  COORDINATE  HEIGHT  ELEV- /                  - SOURCE DETAILS DEPENDING ON TYPE -
R P                  (M)         (M)        (M)   ATION /
D E                                                 (M)  /
-----------------------------------------------------------------------------------------------------------------------
X        1  AREA      -13.30      -13.30  10.00      .00 WIDTH OF AREA (M)=   26.60
                                                                            - PARTICULATE CATEGORIES -
                                                                          1      2      3      4      5      6
                                                   FALL VELOCITY (MPS)     .0010  .0070  .0190  .0370  .0610  .0990
                                                   MASS FRACTION           .1000  .4000  .2800  .1200  .0600  .0400
                                                   REFLECTION COEFFICIENT 1.0000  .8200  .7200  .6500  .5900  .5000
                                                         - SOURCE STRENGTHS ( GRAMS PER SEC  PER SQUARE METER         ) -
                                                                                  - SEASON 1 -
                                       SPEED CATEGORY                          - STABILITY CATEGORIES -
                                                        (1)           (2)          (3)          (4)          (5)           (6)
                                              1    4.00000-01   3.00000-01   2.00000-01   1.00000-01   0.00000       5.00000-02
                                              2    5.00000-01   4.00000-01   3.00000-01   2.50000-01   2.00000-01    1.00000-01
                                              3    0.00000      5.00000-01   4.00000-01   5.00000-01   2.50000-01    0.00000
                                              4    0.00000      0.00000      5.00000-01   5.00000-01   0.00000       0.00000
                                              5    0.00000      0.00000      7.00000-01   7.00000-01   0.00000       0.00000
                                              6    0.00000      0.00000      1.00000+00   1.00000+00   0.00000       0.00000
WARNING - DISTANCE BETWEEN SOURCE      1 AND POINT X,Y=         .00,         .00 IS LESS THAN PERMITTED
X        2 VOLUME       20.00          .00     .90       .00 STANDARD DEVIATION OF THE CROSSWIND SOURCE DISTRIBUTION (M)=   4.70
                                                   STANDARD DEVIATION OF THE VERTICAL SOURCE DISTRIBUTION (M)=   1.00
                                                                            - PARTICULATE CATEGORIES -
                                                                          1      2      3      4      5      6
                                                   FALL VELOCITY (MPS)     .0010  .0070  .0190  .0370  .0610  .0990
                                                   MASS FRACTION           .1000  .4000  .2800  .1200  .0600  .0400
                                                   REFLECTION COEFFICIENT 1.0000  .8200  .7200  .6500  .5900  .5000
                                                         - SOURCE STRENGTHS ( GRAMS PER SEC                             ) -
                                                                                  - SEASON 1 -
                                       SPEED CATEGORY                          - STABILITY CATEGORIES -
                                                        (1)           (2)          (3)          (4)          (5)           (6)
                                              1    1.30000-01   1.00000-01   8.00000-02   4.00000-02   0 00000       2.00000-02
                                              2    1.60000-01   1.30000-01   1.20000-01   1.00000-01   8.00000-02    5.00000-02
                                              3    0.00000      1.60000-01   1.40000-01   1.30000-01   1.00000-01    0.00000
                                              4    0.00000      0.00000      1.60000-01   1.60000-01   0.00000       0.00000
                                              5    0.00000      0.00000      1.90000-01   1.90000-01   0.00000       0.00000
                                              6    0.00000      0.00000      2.20000-01   2.20000-01   0.00000       0.00000
WARNING - DISTANCE BETWEEN SOURCE      2 AND POINT X,Y=         .00,         .00 IS LESS THAN PERMITTED
```

FIGURE D-2. (Continued)

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**** ISCLT *************              HYPOTHETICAL POTASH PROCESSING PLANT                              ******** PAGE      7 ****

                                                   - SOURCE INPUT DATA -

C T SOURCE SOURCE      X           Y       EMISSION  BASE /
A A NUMBER  TYPE  COORDINATE  COORDINATE  HEIGHT   ELEV- /                     - SOURCE DETAILS DEPENDING ON TYPE -
R P                  (M)         (M)        (M)    ATION /
D E                                                  (M)  /
------------------------------------------------------------------------------------------------------------------------------
X       3 VOLUME       30.00          .00   2.60       .00 STANDARD DEVIATION OF THE CROSSWIND SOURCE DISTRIBUTION (M)=   4.70
                                                           STANDARD DEVIATION OF THE VERTICAL SOURCE DISTRIBUTION (M)=   1.00
                                                                                    - PARTICULATE CATEGORIES -
                                                                                   1      2      3      4      5      6
                                                           FALL VELOCITY (MPS)     .0010  .0070  .0190  .0370  .0610  .0990
                                                           MASS FRACTION           .1000  .4000  .2800  .1200  .0600  .0400
                                                           REFLECTION COEFFICIENT 1.0000  .8200  .7200  .6500  .5900  .5000
                                                                 - SOURCE STRENGTHS ( GRAMS PER SEC                                 ) -
                                                                                         - SEASON 1 -
                                           SPEED CATEGORY                            - STABILITY CATEGORIES -
                                                      (1)            (2)            (3)            (4)            (5)            (6)
                                               1   1.30000-01    1.00000-01    8.00000-02    4.00000-02    0.00000        2.00000-02
                                               2   1.60000-01    1.30000-01    1.20000-01    1.00000-01    8.00000-02     5.00000-02
                                               3   0.00000       1.60000-01    1.40000-01    1.30000-01    1.00000-01     0.00000
                                               4   0.00000       0.00000       1.60000-01    1.60000-01    0.00000        0.00000
                                               5   0.00000       0.00000       1.90000-01    1.90000-01    0.00000        0.00000
                                               6   0.00000       0.00000       2.20000-01    2.20000-01    0.00000        0.00000
WARNING - DISTANCE BETWEEN SOURCE      3 AND POINT X,Y=          .00,          .00 IS LESS THAN PERMITTED
X       4 VOLUME       40.00          .00   4.30       .00 STANDARD DEVIATION OF THE CROSSWIND SOURCE DISTRIBUTION (M)=   4.70
                                                           STANDARD DEVIATION OF THE VERTICAL SOURCE DISTRIBUTION (M)=   1.00
                                                                                    - PARTICULATE CATEGORIES -
                                                                                   1      2      3      4      5      6
                                                           FALL VELOCITY (MPS)     .0010  .0070  .0190  .0370  .0610  .0990
                                                           MASS FRACTION           .1000  .4000  .2800  .1200  .0600  .0400
                                                           REFLECTION COEFFICIENT 1.0000  .8200  .7200  .6500  .5900  .5000
                                                                 - SOURCE STRENGTHS ( GRAMS PER SEC                                 ) -
                                                                                         - SEASON 1 -
                                           SPEED CATEGORY                            - STABILITY CATEGORIES -
                                                      (1)            (2)            (3)            (4)            (5)            (6)
                                               1   1.30000-01    1.00000-01    8.00000-02    4.00000-02    0.00000        2.00000-02
                                               2   1.60000-01    1.30000-01    1.20000-01    1.00000-01    8.00000-02     5.00000-02
                                               3   0.00000       1.60000-01    1.40000-01    1.30000-01    1.00000-01     0.00000
                                               4   0.00000       0.00000       1.60000-01    1.60000-01    0.00000        0.00000
                                               5   0.00000       0.00000       1.90000-01    1.90000-01    0.00000        0.00000
                                               6   0.00000       0.00000       2.20000-01    2.20000-01    0.00000        0.00000
WARNING - DISTANCE BETWEEN SOURCE      4 AND POINT X,Y=          .00,          .00 IS LESS THAN PERMITTED
```

FIGURE D-2. (Continued)

```
**** ISCLT *************           HYPOTHETICAL POTASH PROCESSING PLANT                          ******** PAGE      8 ****

                                            - SOURCE INPUT DATA -

C T SOURCE SOURCE      X            Y       EMISSION  BASE /
A A NUMBER  TYPE  COORDINATE  COORDINATE   HEIGHT  ELEV- /                  - SOURCE DETAILS DEPENDING ON TYPE -
R P                  (M)          (M)         (M)   ATION /
D E                                                   (M)  /
-------------------------------------------------------------------------------------------------------------------------
X        5 VOLUME       49.00          .00    6.10      .00 STANDARD DEVIATION OF THE CROSSWIND SOURCE DISTRIBUTION (M)=   4.70
                                                             STANDARD DEVIATION OF THE VERTICAL SOURCE DISTRIBUTION (M)=   1.00
                                                                                 - PARTICULATE CATEGORIES -
                                                                                 1      2      3      4      5      6
                                                             FALL VELOCITY (MPS)       .0010  .0070  .0190  .0370  .0610  .0990
                                                             MASS FRACTION             .1000  .4000  .2800  .1200  .0600  .0400
                                                             REFLECTION COEFFICIENT 1.0000  .8200  .7200  .6500  .5900  .5000
                                                                  - SOURCE STRENGTHS ( GRAMS PER SEC                           ) -
                                                                                       - SEASON 1 -
                                              SPEED CATEGORY                     - STABILITY CATEGORIES -
                                                                (1)            (2)           (3)           (4)           (5)            (6)
                                                       1    1.30000-01   1.09000-01   8.00000-02   4.00000-02   0.00000       2.00000-02
                                                       2    1.60000-01   1.30000-01    20000-01   1.00000-01   8.00000-02    5.00000-02
                                                       3    0.00000      1.60000-01   . 0000-01   1.30000-01   1.00000-01    0.00000
                                                       4    0.00000      0.00000      1.60000-01   1.60000-01   0.00000       0.00000
                                                       5    0.00000      0.00000      1.90000-01   1.90000-01   0.00000       0.00000
                                                       6    0.00000      0.00000      2.20000-01   2.20000-01   0.00000       0.00000
WARNING - DISTANCE BETWEEN SOURCE      5 AND POINT X,Y=        .00,         .00 IS LESS THAN PERMITTED
X        6 VOLUME       59.00          .00    7.80      .00 STANDARD DEVIATION OF THE CROSSWIND SOURCE DISTRIBUTION (M)=   4.70
                                                             STANDARD DEVIATION OF THE VERTICAL SOURCE DISTRIBUTION (M)=   1.00
                                                                                 - PARTICULATE CATEGORIES -
                                                                                 1      2      3      4      5      6
                                                             FALL VELOCITY (MPS)       .0010  .0070  .0190  .0370  .0610  .0990
                                                             MASS FRACTION             .1000  .4000  .2800  .1200  .0600  .0400
                                                             REFLECTION COEFFICIENT 1.0000  .8200  .7200  .6500  .5900  .5000
                                                                  - SOURCE STRENGTHS ( GRAMS PER SEC                           ) -
                                                                                       - SEASON 1 -
                                              SPEED CATEGORY                     - STABILITY CATEGORIES -
                                                                (1)            (2)           (3)           (4)           (5)            (6)
                                                       1    1.30000-01   1.00000-01   8.00000-02   4.00000-02   0.00000       2.00000-02
                                                       2    1.60000-01   1.30000-01   1.20000-01   1.00000-01   8.00000-02    5.00000-02
                                                       3    0.00000      1.60000-01   1.40000-01   1.30000-01   1.00000-01    0.00000
                                                       4    0.00000      0.00000      1.60000-01   1.60000-01   0.00000       0.00000
                                                       5    0.00000      0.00000      1.90000-01   1.90000-01   0.00000       0.00000
                                                       6    0.00000      0.00000      2.20000-01   2.20000-01   0.00000       0.00000
WARNING - DISTANCE BETWEEN SOURCE      6 AND POINT X,Y=        .00,         .00 IS LESS THAN PERMITTED
```

FIGURE D-2. (Continued)

```
**** ISCLT *************               HYPOTHETICAL POTASH PROCESSING PLANT                          ******** PAGE      9 ****

                                                      - SOURCE INPUT DATA -

C T SOURCE SOURCE      X            Y       EMISSION  BASE /
A A NUMBER  TYPE  COORDINATE  COORDINATE   HEIGHT  ELEV- /                  - SOURCE DETAILS DEPENDING ON TYPE -
R P                  (M)          (M)        (M)   ATION /
D E                                                 (M)  /
---------------------------------------------------------------------------------------------------------------------------
X        7 VOLUME       69.00          .00   9.60      .00 STANDARD DEVIATION OF THE CROSSWIND SOURCE DISTRIBUTION (M)=   4.70
                                                           STANDARD DEVIATION OF THE VERTICAL SOURCE DISTRIBUTION (M)=   1.00
                                                                                - PARTICULATE CATEGORIES -
                                                                               1      2      3      4      5      6
                                                           FALL VELOCITY (MPS)      .0010  .0070  .0190  .0370  .0610  .0990
                                                           MASS FRACTION            .1000  .4000  .2800  .1200  .0600  .0400
                                                           REFLECTION COEFFICIENT 1.0000  .8200  .7200  .6500  .5900  .5000
                                                                - SOURCE STRENGTHS ( GRAMS PER SEC                          ) -
                                                                                         - SEASON 1 -
                                            SPEED CATEGORY                          - STABILITY CATEGORIES -
                                                          (1)            (2)            (3)            (4)            (5)            (6)
                                                 1      1.30000-01     1.00000-01     8.00000-02     4.00000-02     0.00000        2.00000-02
                                                 2      1.60000-01     1.30000-01     1.20000-01     1.00000-01     8.00000-02     5.00000-02
                                                 3      0.00000        1.60000-01     1.40000-01     1.30000-01     1.00000-01     0.00000
                                                 4      0.00000        0.00000        1.60000-01     1.60000-01     0.00000        0.00000
                                                 5      0.00000        0.00000        1.90000-01     1.90000-01     0.00000        0.00000
                                                 6      0.00000        0.00000        2.20000-01     2.20000-01     0.00000        0.00000
WARNING - DISTANCE BETWEEN SOURCE      7 AND POINT X,Y=          .00,         .00 IS LESS THAN PERMITTED
X        8 VOLUME       79.00          .00  11.30      .00 STANDARD DEVIATION OF THE CROSSWIND SOURCE DISTRIBUTION (M)=   4.70
                                                           STANDARD DEVIATION OF THE VERTICAL SOURCE DISTRIBUTION (M)=   1.00
                                                                                - PARTICULATE CATEGORIES -
                                                                               1      2      3      4      5      6
                                                           FALL VELOCITY (MPS)      .0010  .0070  .0190  .0370  .0610  .0990
                                                           MASS FRACTION            .1000  .4000  .2800  .1200  .0600  .0400
                                                           REFLECTION COEFFICIENT 1.0000  .8200  .7200  .6500  .5900  .5000
                                                                - SOURCE STRENGTHS ( GRAMS PER SEC                          ) -
                                                                                         - SEASON 1 -
                                            SPEED CATEGORY                          - STABILITY CATEGORIES -
                                                          (1)            (2)            (3)            (4)            (5)            (6)
                                                 1      1.30000-01     1.00000-01     8.00000-02     4.00000-02     0.00000        2.00000-02
                                                 2      1.60000-01     1.30000-01     1.20000-01     1.00000-01     8.00000-02     5.00000-02
                                                 3      0.00000        1.60000-01     1.40000-01     1.30000-01     1.00000-01     0.00000
                                                 4      0.00000        0.00000        1.60000-01     1.60000-01     0.00000        0.00000
                                                 5      0.00000        0.00000        1.90000-01     1.90000-01     0.00000        0.00000
                                                 6      0.00000        0.00000        2.20000-01     2.20000-01     0.00000        0.00000
WARNING - DISTANCE BETWEEN SOURCE      8 AND POINT X,Y=          .00,         .00 IS LESS THAN PERMITTED
```

FIGURE D-2. (Continued)

```
**** ISCLT *************                    HYPOTHETICAL POTASH PROCESSING PLANT                              ******** PAGE    10 ****

                                               - SOURCE INPUT DATA -

C T SOURCE SOURCE      X           Y        EMISSION  BASE /
A A NUMBER  TYPE  COORDINATE  COORDINATE   HEIGHT   ELEV- /                    - SOURCE DETAILS DEPENDING ON TYPE -
R P                   (M)         (M)         (M)    ATION /
D F                                                    (M)  /
-----------------------------------------------------------------------------------------------------------------------------------
X        9 VOLUME      89.00          .00  13.00      .00 STANDARD DEVIATION OF THE CROSSWIND SOURCE DISTRIBUTION (M)=   4.70
                                                          STANDARD DEVIATION OF THE VERTICAL SOURCE DISTRIBUTION (M)=   1.00
                                                                              - PARTICULATE CATEGORIES -
                                                                               1       2       3       4       5       6
                                                          FALL VELOCITY (MPS)      .0010   .0070   .0190   .0370   .0610   .0990
                                                          MASS FRACTION            .1000   .4000   .2800   .1200   .0600   .0400
                                                          REFLECTION COEFFICIENT 1.0000   .8200   .7200   .6500   .5900   .5000
                                                                - SOURCE STRENGTHS ( GRAMS PER SEC                                 ) -
                                                                                       - SEASON 1 -
                                  SPEED CATEGORY                                 - STABILITY CATEGORIES -
                                                     (1)           (2)           (3)           (4)           (5)           (6)
                                         1       1.30000-01    1.00000-01    8.00000-02    4.00000-02    0.00000       2.00000-02
                                         2       1.60000-01    1.30000-01    1.20000-01    1.00000-01    8.00000-02    5.00000-02
                                         3       0.00000       1.60000-01    1.40000-01    1.30000-01    1.00000-01    0.00000
                                         4       0.00000       0.00000       1.60000-01    1.60000-01    0.00000       0.00000
                                         5       0.00000       0.00000       1.90000-01    1.90000-01    0.00000       0.00000
                                         6       0.00000       0.00000       2.20000-01    2.20000-01    0.00000       0.00000
WARNING - DISTANCE BETWEEN SOURCE      9 AND POINT X,Y=          .00,          .00 IS LESS THAN PERMITTED
X       10 VOLUME      99.00          .00  14.80      .00 STANDARD DEVIATION OF THE CROSSWIND SOURCE DISTRIBUTION (M)=   4.70
                                                          STANDARD DEVIATION OF THE VERTICAL SOURCE DISTRIBUTION (M)=   1.00
                                                                              - PARTICULATE CATEGORIES -
                                                                               1       2       3       4       5       6
                                                          FALL VELOCITY (MPS)      .0010   .0070   .0190   .0370   .0610   .0990
                                                          MASS FRACTION            .1000   .4000   .2800   .1200   .0600   .0400
                                                          REFLECTION COEFFICIENT 1.0000   .8200   .7200   .6500   .5900   .5000
                                                                - SOURCE STRENGTHS ( GRAMS PER SEC                                 ) -
                                                                                       - SEASON 1 -
                                  SPEED CATEGORY                                 - STABILITY CATEGORIES -
                                                     (1)           (2)           (3)           (4)           (5)           (6)
                                         1       1.30000-01    1.00000-01    8.00000-02    4.00000-02    0.00000       2.00000-02
                                         2       1.60000-01    1.30000-01    1.20000-01    1.00000-01    8.00000-02    5.00000-02
                                         3       0.00000       1.60000-01    1.40000-01    1.30000-01    1.00000-01    0.00000
                                         4       0.00000       0.00000       1.60000-01    1.60000-01    0.00000       0.00000
                                         5       0.00000       0.00000       1.90000-01    1.90000-01    0.00000       0.00000
                                         6       0.00000       0.00000       2.20000-01    2.20000-01    0.00000       0.00000
WARNING - DISTANCE BETWEEN SOURCE     10 AND POINT X,Y=          .00,          .00 IS LESS THAN PERMITTED
WARNING - DISTANCE BETWEEN SOURCE     10 AND POINT X,Y=       200.00,          .00 IS LESS THAN PERMITTED
```

FIGURE D-2. (Continued)

```
**** ISCLT *************                 HYPOTHETICAL POTASH PROCESSING PLANT                        ********* PAGE     11 ****

                                                    - SOURCE INPUT DATA -

C T SOURCE SOURCE      X           Y       EMISSION  BASE /
A A NUMBER  TYPE  COORDINATE  COORDINATE   HEIGHT   ELEV- /                  - SOURCE DETAILS DEPENDING ON TYPE -
R P                  (M)         (M)         (M)    ATION /
D E                                                   (M)  /
-------------------------------------------------------------------------------------------------------------------------------
X       11 VOLUME      109.00          .00  16.50       .00 STANDARD DEVIATION OF THE CROSSWIND SOURCE DISTRIBUTION (M)=   4.70
                                                            STANDARD DEVIATION OF THE VERTICAL SOURCE DISTRIBUTION (M)=   1.00
                                                                                - PARTICULATE CATEGORIES -
                                                                                 1      2      3      4      5      6
                                                            FALL VELOCITY (MPS)      .0010  .0070  .0190  .0370  .0610  .0990
                                                            MASS FRACTION            .1000  .4000  .2800  .1200  .0600  .0400
                                                            REFLECTION COEFFICIENT 1.0000  .8200  .7200  .6500  .5900  .5000
                                                                 - SOURCE STRENGTHS ( GRAMS PER SEC                                ) -
                                                                                          - SEASON 1 -
                                             SPEED CATEGORY                          - STABILITY CATEGORIES -
                                                               (1)            (2)           (3)           (4)           (5)           (6)
                                                       1    1.30000-01   1.00000-01   8.00000-02   4.00000-02   0.00000       2.00000-02
                                                       2    1.60000-01   1.30000-01   1.20000-01   1.00000-01   8.00000-02   5.00000-02
                                                       3    0.00000      1.60000-01   1.40000-01   1.30000-01   1.00000-01   0.00000
                                                       4    0.00000      0.00000      1.60000-01   1.60000-01   0.00000      0.00000
                                                       5    0.00000      0.00000      1.90000-01   1.90000-01   0.00000      0.00000
                                                       6    0.00000      0.00000      2.20000-01   2.20000-01   0.00000      0.00000
WARNING - DISTANCE BETWEEN SOURCE     11 AND POINT X,Y=          .00,          .00 IS LESS THAN PERMITTED
WARNING - DISTANCE BETWEEN SOURCE     11 AND POINT X,Y=      200.00,          .00 IS LESS THAN PERMITTED
X       12 VOLUME      121.00          .00  22.50       .00 STANDARD DEVIATION OF THE CROSSWIND SOURCE DISTRIBUTION (M)=  10.80
                                                            STANDARD DEVIATION OF THE VERTICAL SOURCE DISTRIBUTION (M)=  11.60
                                                                 - SOURCE STRENGTHS ( GRAMS PER SEC                                ) -
                                                                      SEASON 1      SEASON 2      SEASON 3      SEASON 4
                                                                      2.63000+00
WARNING - DISTANCE BETWEEN SOURCE     12 AND POINT X,Y=          .00,          .00 IS LESS THAN PERMITTED
WARNING - DISTANCE BETWEEN SOURCE     12 AND POINT X,Y=      200.00,          .00 IS LESS THAN PERMITTED
X       13 VOLUME      144.00          .00  22.50       .00 STANDARD DEVIATION OF THE CROSSWIND SOURCE DISTRIBUTION (M)=  10.80
                                                            STANDARD DEVIATION OF THE VERTICAL SOURCE DISTRIBUTION (M)=  11.60
                                                                 - SOURCE STRENGTHS ( GRAMS PER SEC                                ) -
                                                                      SEASON 1      SEASON 2      SEASON 3      SEASON 4
                                                                      2.63000+00
WARNING - DISTANCE BETWEEN SOURCE     13 AND POINT X,Y=      200.00,          .00 IS LESS THAN PERMITTED
X       14 VOLUME      167.00          .00  22.50       .00 STANDARD DEVIATION OF THE CROSSWIND SOURCE DISTRIBUTION (M)=  10.80
                                                            STANDARD DEVIATION OF THE VERTICAL SOURCE DISTRIBUTION (M)=  11.60
                                                                 - SOURCE STRENGTHS ( GRAMS PER SEC                                ) -
                                                                      SEASON 1      SEASON 2      SEASON 3      SEASON 4
                                                                      2.63000+00
WARNING - DISTANCE BETWEEN SOURCE     14 AND POINT X,Y=      200.00,          .00 IS LESS THAN PERMITTED
X       15 VOLUME      190.00          .00  22.50       .00 STANDARD DEVIATION OF THE CROSSWIND SOURCE DISTRIBUTION (M)=  10.80
                                                            STANDARD DEVIATION OF THE VERTICAL SOURCE DISTRIBUTION (M)=  11.60
                                                                 - SOURCE STRENGTHS ( GRAMS PER SEC                                ) -
                                                                      SEASON 1      SEASON 2      SEASON 3      SEASON 4
                                                                      2.63000+00
WARNING - DISTANCE BETWEEN SOURCE     15 AND POINT X,Y=      200.00,          .00 IS LESS THAN PERMITTED
```

FIGURE D-2. (Continued)

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**** ISCLT *************             HYPOTHETICAL POTASH PROCESSING PLANT                          ******** PAGE    12 ****

                                              - SOURCE INPUT DATA -

C T SOURCE SOURCE     X           Y       EMISSION  BASE /
A A NUMBER  TYPE  COORDINATE  COORDINATE  HEIGHT   ELEV- /                      - SOURCE DETAILS DEPENDING ON TYPE -
R P                  (M)          (M)       (M)    ATION /
D E                                                  (M) /
-------------------------------------------------------------------------------------------------------------------------------
X       16   STACK      201.00        30.00  50.00      .00 GAS EXIT TEMP (DEG K)= 340.00, GAS EXIT VEL. (M/SEC)=  8.00,
                                                            STACK DIAMETER (M)= 1.000, HEIGHT OF ASSO. BLDG. (M)= 25.00, WIDTH OF
                                                            ASSO. BLDG. (M)=  67.00, WAKE EFFECTS FLAG = 0
                                                                 - SOURCE STRENGTHS ( GRAMS PER SEC                          ) -
                                                                        SEASON 1      SEASON 2      SEASON 3      SEASON 4
                                                                        5.00000+00
WARNING - DISTANCE BETWEEN SOURCE     16 AND POINT X,Y=     200.00,         .00 IS LESS THAN PERMITTED
```

FIGURE D-2. (Continued)

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**** ISCLT *************                    HYPOTHETICAL POTASH PROCESSING PLANT                          ********* PAGE    13 ****

      **   ANNUAL GROUND LEVEL CONCENTRATION ( MICROGRAMS PER CUBIC METER            ) DUE TO SOURCE     1          **
                                                   - GRID SYSTEM RECEPTORS -
                                                 - X AXIS (DISTANCE, METERS) -
              -3000.000    -2000.000    -1500.000    -1250.000    -1000.000     -800.000     -600.000     -400.000     -200.000
Y AXIS (DISTANCE        , METERS  )                             -  CONCENTRATION  -
            ---------------------------------------------------------------------------------------------------------------

    3000.000   15.233117    18.595704    20.120573    20.937885    21.417454    22.001633    22.406949    22.606291    22.570146
    2000.000   25.096383    30.928904    35.742262    38.612876    41.011132    42.403178    44.506822    46.009526    46.550323
    1500.000   31.709255    44.398622    51.465082    55.597269    62.314393    67.071202    71.372622    75.197296    77.704108
    1250.000   35.930118    53.213629    64.383079    71.174443    78.267578    87.173549    94.677279   101.485730   107.132532
    1000.000   37.766652    63.051426    82.062576    92.703184   105.991836   115.319864   131.812984   149.205359   157.583286
     800.000   39.249267    71.968681    98.379997   116.292750   136.074072   157.789762   175.761223   206.473080   232.192675
     600.000   40.465551    76.758965   118.218757   143.250614   179.014204   213.363441   266.701855   311.931931   373.359833
     400.000   41.363467    80.610969   127.497962   168.310390   237.422142   296.775852   396.050018   560.887863   693.712097
     200.000   41.881215    82.986560   134.333405   181.318153   259.551788   373.980713   584.012718   944.041451  1783.365067
        .000   42.571451    85.317893   140.007008   191.298014   279.566078   414.570820   682.700706  1322.484818  3285.431641
    -200.000   38.903567    74.349024   116.213557   152.569792   209.553871   286.744953   410.712780   561.639748  1131.112656
    -400.000   35.948085    65.247273    96.100362   119.641985   153.930771   182.522518   244.185183   375.713684   705.076614
    -600.000   32.805121    55.652445    76.136149    88.818096   111.977670   134.550871   181.198156   290.793839   493.842030
    -800.000   29.562064    46.150130    61.585382    73.588823    87.303426   108.098702   155.070227   232.001640   330.179653
   -1000.000   26.292830    39.442503    52.371612    60.046659    73.130736    98.494929   137.512161   196.912264   235.632189
   -1250.000   22.506602    33.980226    42.217519    49.410876    67.765956    89.187100   114.890892   146.178448   168.775528
   -1500.000   19.944419    28.997093    35.912429    46.892557    62.890011    78.279366    99.195431   113.911121   127.271148
   -2000.000   16.304027    21.790416    33.576216    41.707737    51.116381    60.794123    67.998775    74.745510    80.495930
   -3000.000   10.877412    19.723071    26.039579    30.257155    33.239165    35.658067    37.927289    39.983489    41.750175

                                                   - GRID SYSTEM RECEPTORS -
                                                 - X AXIS (DISTANCE, METERS) -
                   .000      200.000      400.000      600.000      800.000     1000.000     1250.000     1500.000     2000.000
Y AXIS (DISTANCE        , METERS  )                             -  CONCENTRATION  -
            ---------------------------------------------------------------------------------------------------------------

    3000.000   22.677743    21.234118    20.180590    18.980791    17.675214    16.298037    14.720780    13.292376    11.146984
    2000.000   47.175719    42.651813    39.090896    35.017848    30.757320    27.181067    23.796320    20.633406    16.882098
    1500.000   79.679336    69.482379    60.991139    51.987680    43.676129    37.682801    30.940405    26.947521    23.870794
    1250.000  111.115554    94.029237    79.371454    63.736940    53.609860    44.416317    37.490723    36.281175    32.648046
    1000.000  166.803640   134.636581   109.220165    82.987275    65.703952    56.300954    53.253517    49.731992    40.562992
     800.000  253.041491   191.863989   137.076151   102.840727    84.535987    78.478118    71.487429    62.825632    51.134112
     600.000  430.659637   292.326946   189.365541   144.207319   126.049892   112.113587    93.622082    85.190753    65.830317
     400.000  883.975342   451.037827   306.298756   240.303576   192.648809   174.610664   141.942419   116.528004    81.035526
     200.000 2509.963715   975.794449   595.160080   489.547577   353.187038   263.139072   193.901257   148.790634    95.964260
        .000     .000000  3772.401001  1647.355499   875.738564   539.581223   367.059872   252.143021   184.859499   112.749397
    -200.000 2865.911804  1490.095734   898.792297   631.850784   427.472961   306.749363   219.599201   165.272757   104.003670
    -400.000 1257.482544   706.160335   518.893097   382.899570   296.574131   248.781038   185.768887   145.250357    95.394717
    -600.000  666.668755   469.147308   323.017250   253.917171   208.036390   178.599720   145.392815   124.021405    85.636791
    -800.000  410.062202   318.460144   234.052969   182.217319   152.317839   133.224499   116.277280    99.640745    75.469131
   -1000.000  278.792706   229.037271   187.656651   146.848982   119.347918   103.095357    91.363341    82.141430    64.307633
   -1250.000  192.338352   164.715227   139.280561   113.313157    97.128614    81.902442    69.596685    63.508497    53.744160
   -1500.000  141.608788   124.534027   109.166794    93.134131    79.307329    69.343916    57.827950    50.529677    44.425852
   -2000.000   87.012285    79.033845    72.158997    64.453167    56.486966    50.276683    44.472208    38.938442    30.609369
   -3000.000   43.907272    41.185440    38.965236    36.493958    33.848027    31.091059    27.953678    25.337409    21.431062
```

FIGURE D-2. (Continued)

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**** ISCLT *************                HYPOTHETICAL POTASH PROCESSING PLANT                         ******** PAGE    14 ****

     **   ANNUAL GROUND LEVEL CONCENTRATION ( MICROGRAMS PER CUBIC METER           ) DUE TO SOURCE     1 (CONT.)  **
                                                  - GRID SYSTEM RECEPTORS -
                                               - X AXIS (DISTANCE, METERS) -
                    3000.000
Y AXIS (DISTANCE        , METERS  )                          -  CONCENTRATION  -
        ------------------------------------------------------------------------------------------------------------

    3000.000      7.846520
    2000.000     15.047365
    1500.000     20.266992
    1250.000     24.082685
    1000.000     30.159071
     800.000     35.293285
     600.000     40.496795
     400.000     45.658641
     200.000     50.646130
        .000     56.332646
    -200.000     53.509070
    -400.000     50.881071
    -600.000     47.904521
    -800.000     44.684405
   -1000.000     41.306958
   -1250.000     37.267332
   -1500.000     32.525209
   -2000.000     25.457349
   -3000.000     15.215548

     **   ANNUAL GROUND LEVEL CONCENTRATION ( MICROGRAMS PER CUBIC METER           ) DUE TO SOURCE     1 (CONT.)  **
                                                  - DISCRETE RECEPTORS -
   X          Y       CONCENTRATION         X          Y      CONCENTRATION          X          Y      CONCENTRATION
 RANGE     AZIMUTH                        RANGE     AZIMUTH                        RANGE     AZIMUTH
           BEARING                                  BEARING                                  BEARING
(METERS) (DEGREES)                       (METERS) (DEGREES)                       (METERS) (DEGREES)
        ------------------------------------------------------------------------------------------------------------

  2108.0       14.0     35.678412
              - 10 CONTRIBUTING VALUES TO PROGRAM DETERMINED MAXIMUM 10 OF COMBINED SOURCES      1,

                                 X             Y          CONCENTRATION
                             COORDINATE    COORDINATE

                              (METERS)      (METERS )
                             -------------------------------------------
                                200.00           .00       3772.401001
                               -200.00           .00       3285.431641
                                   .00       -200.00       2865.911804
                                   .00        200.00       2509.963715
                               -200.00        200.00       1783.365067
                                400.00           .00       1647.355499
                                200.00       -200.00       1490.095734
                               -400.00           .00       1322.484818
```

FIGURE D-2. (Continued)

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**** ISCLT *************              HYPOTHETICAL POTASH PROCESSING PLANT                          ********* PAGE     15 ****

     **   ANNUAL GROUND LEVEL CONCENTRATION ( MICROGRAMS PER CUBIC METER            ) DUE TO SOURCE      1 (CONT ) **
             - 10 CONTRIBUTING VALUES TO PROGRAM DETERMINED MAXIMUM 10 OF COMBINED SOURCES       1.

                                     X           Y         CONCENTRATION
                                 COORDINATE   COORDINATE

                                  (METERS)     (METERS )
                                ---------------------------------------
                                        00      -400 00     1257 482544
                                   -200 00      -200.00     1131.112656
```

FIGURE D-2. (Continued)

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**** ISCLT **************                    HYPOTHETICAL POTASH PROCESSING PLANT                         ********* PAGE     16 ****

     **   ANNUAL GROUND LEVEL CONCENTRATION ( MICROGRAMS PER CUBIC METER              ) DUE TO SOURCE      2          **
                                                      - GRID SYSTEM RECEPTORS -
                                                    - X AXIS (DISTANCE, METERS) -
                  -3000.000     -2000.000     -1500.000     -1250.000     -1000 000      -800.000      -600.000      -400.000      -200.000
Y AXIS (DISTANCE          , METERS   )                                 -  CONCENTRATION  -
           ----------------------------------------------------------------------------------------------------------------

   3000 000          .006965       .008660       .009457       .009761       .010159       .010476       .010711       .010850       .010881
   2000 000          .011515       .014112       .016642       .018078       .019329       .020396       .021206       .022056       .022457
   1500 000          .014513       .020459       .023424       .025849       .029185       .031639       .034546       .036007       .037534
   1250 000          .016475       .024460       .029795       .032337       .036506       .040981       .044942       .048577       .051848
   1000 000          .017381       .028933       .037868       .042992       .048070       .053978       .062401       .071700       .076554
    800 000          .018161       .032995       .045305       .053804       .063414       .071498       .082892       .098869       .113060
    600 000          .018828       .035478       .054043       .066131       .083236       .100129       .120385       .149439       .184907
    400 000          .019354       .037530       .059212       .078152       .108406       .130255       .187572       .255829       .353476
    200 000          .019713       .038928       .062940       .085020       .122069       .175870       .278131       .478446       .904135
        000          .020141       .040275       .066056       .090362       .132433       .196519       .328299       .672045      2.154006
   -200 000          .018523       .035441       .055556       .073214       .101294       .139285       .203643       .307297       .600412
   -400 000          .017138       .031178       .046102       .057673       .073871       .089311       .121138       .172356       .354228
   -600 000          .015666       .026677       .036511       .043017       .054393       .065676       .081989       .136328       .239562
   -800 000          .014146       .022212       .029684       .035479       .042149       .049192       .071738       .107757       .155911
  -1000 000          .012613       .018985       .025150       .028820       .033350       .045428       .063469       .091244       .110504
  -1250 000          .010088       .016298       .020183       .022614       .031196       .040974       .052774       .067500       .078479
  -1500 000          .009587       .013861       .016500       .021602       .028850       .035847       .046095       .052445       .058886
  -2000 000          .007797       .010060       .015437       .019099       .023342       .028046       .031120       .034312       .037064
  -3000 000          .005056       .009041       .011869       .013331       .015147       .016276       .017341       .018313       .019156

                                                      - GRID SYSTEM RECEPTORS -
                                                    - X AXIS (DISTANCE, METERS) -
                      .000       200.000       400.000       600.000       800.000      1000.000      1250.000      1500.000      2000.000
Y AXIS (DISTANCE          , METERS   )                                 -  CONCENTRATION  -
           ----------------------------------------------------------------------------------------------------------------

   3000 000          .010848       .010392       .009913       .009361       .008754       .008109       .007344       .006638       .005521
   2000 000          .022493       .021035       .019385       .017466       .015402       .013650       .011886       .010248       .007718
   1500 000          .037903       .034548       .030533       .025980       .022042       .018914       .015416       .012930       .012740
   1250 000          .052833       .047111       .040069       .032426       .027106       .022300       .017995       .017851       .016195
   1000 000          .079373       .068329       .054712       .042491       .033334       .027078       .026386       .024759       .020257
    800 000          .120597       .098866       .071447       .052989       .040854       .039210       .035871       .031549       .025654
    600 000          .207455       .155380       .100980       .070368       .064027       .057075       .047524       .043083       .032994
    400 000          .446022       .277381       .155132       .127025       .100625       .090279       .072450       .059067       .040699
    200 000         1.573416       .606844       .359376       .270137       .188113       .137146       .099690       .075734       .048207
        000          .000000      3.850015      1.056811       .494085       .209897       .191973       .129765       .094095       .056687
   -200 000         2.098428      1.020814       .535093       .343357       .223884       .157454       .111431       .083148       .051835
   -400 000          .647183       .466688       .275795       .200776       .151209       .126034       .092458       .072006       .047058
   -600 000          .316597       .255600       .177023       .128390       .105058       .089115       .071508       .060938       .041770
   -800 000          .190098       .164571       .124354       .095957       .075864       .066355       .057230       .048576       .036592
  -1000 000          .128307       .115250       .095741       .076522       .061779       .050939       .045054       .040141       .031008
  -1250 000          .087984       .081019       .070451       .058439       .049890       .041873       .034240       .031178       .026020
  -1500 000          .064584       .060393       .054204       .047065       .040541       .035328       .029328       .024820       .021614
  -2000 000          .039615       .037712       .035056       .031926       .028522       .025531       .022509       .019642       .015021
  -3000 000          .019992       .019359       .018535       .017580       .016526       .015402       .014108       .012784       .010758
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FIGURE D-2. (Continued)

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**** ISCLT *************                HYPOTHETICAL POTASH PROCESSING PLANT                          ******** PAGE    17 ****

      **   ANNUAL GROUND LEVEL CONCENTRATION ( MICROGRAMS PER CUBIC METER             ) DUE TO SOURCE      2 (CONT.)  **
                                                   - GRID SYSTEM RECEPTORS -
                                                 - X AXIS (DISTANCE, METERS) -
                  3000.000
Y AXIS (DISTANCE         , METERS  )                          -  CONCENTRATION  -
          ------------------------------------------------------------------------------------------------------------

    3000.000         .003765
    2000.000         .007405
    1500.000         .010053
    1250.000         .011851
    1000.000         .014988
     800.000         .017552
     600.000         .020156
     400.000         .022742
     200.000         .025241
        .000         .028059
    -200.000         .026482
    -400.000         .025017
    -600.000         .023387
    -800.000         .021652
   -1000.000         .019854
   -1250.000         .017615
   -1500.000         .015531
   -2000.000         .012252
   -3000.000         .007459

                                                     - DISCRETE RECEPTORS -
    X          Y         CONCENTRATION            X          Y       CONCENTRATION             X          Y        CONCENTRATION
  RANGE     AZIMUTH                             RANGE     AZIMUTH                            RANGE     AZIMUTH
            BEARING                                       BEARING                                      BEARING
 (METERS) (DEGREES)                            (METERS) (DEGREES)                           (METERS) (DEGREES)
          ------------------------------------------------------------------------------------------------------------

   2108.0       14.0       .017735
             - 10 CONTRIBUTING VALUES TO PROGRAM DETERMINED MAXIMUM 10 OF COMBINED SOURCES      2,   -11,

                                          X           Y          CONCENTRATION
                                     COORDINATE   COORDINATE

                                      (METERS)     (METERS )
                                     ------------------------------------------
                                         200.00          .00         3.850015
                                        -200.00          .00         2.154006
                                            .00      -200.00         2.098428
                                            .00       200.00         1.573416
                                         400.00          .00         1.056811
                                         200.00      -200.00         1.020814
                                        -200.00       200.00          .904135
                                         200.00       200.00          .606844
```

FIGURE D-2.   (Continued)

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**** ISCLT *************                HYPOTHETICAL POTASH PROCESSING PLANT                        ******** PAGE     18 ****

      **   ANNUAL GROUND LEVEL CONCENTRATION ( MICROGRAMS PER CUBIC METER            ) DUE TO SOURCE      2 (CONT ) **
                - 10 CONTRIBUTING VALUES TO PROGRAM DETERMINED MAXIMUM 10 OF COMBINED SOURCES      2,   -11,

                                              X           Y         CONCENTRATION
                                        COORDINATE   COORDINATE

                                         (METERS)     (METERS )
                                        ------------------------------------
                                           -400.00         .00          .672045
                                            600.00         .00          .494085
```

FIGURE D-2.   (Continued)

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**** ISCLT *************                    HYPOTHETICAL POTASH PROCESSING PLANT                              ********* PAGE     46 ****

 **   ANNUAL GROUND LEVEL CONCENTRATION ( MICROGRAMS PER CUBIC METER                    )        FROM COMBINED SOURCES      2,    -11,
                                                               - GRID SYSTEM RECEPTORS -
                                                            - X AXIS (DISTANCE, METERS) -
                    -3000.000    -2000.000    -1500.000    -1250.000    -1000.000     -800.000     -600.000     -400.000     -200.000
Y AXIS (DISTANCE          , METERS   )                             -   CONCENTRATION   -
           ------------------------------------------------------------------------------------------------------------------------

  3000.000           .069304      .086142      .094322      .097365      .101363      .104822      .107503      .109256      .109943
  2000.000           .113857      .139537      .163850      .178439      .191507      .200914      .210418      .220121      .225575
  1500.000           .142735      .201219      .230082      .252009      .285347      .310634      .333440      .355209      .373983
  1250.000           .160232      .239272      .291938      .315699      .353433      .398058      .439218      .476062      .512328
  1000.000           .170188      .281320      .367370      .417560      .464783      .516398      .599623      .677265      .745408
   800.000           .177858      .318479      .436039      .516717      .609051      .682061      .781311      .937151     1.077942
   600.000           .184442      .342368      .513902      .628419      .785794      .941902     1.117271     1.364402     1.738784
   400.000           .189671      .361978      .562360      .733812      .998682     1.268263     1.687760     2.241689     3.028498
   200.000           .193323      .375518      .596982      .795638     1.119701     1.567403     2.384049     4.056708     6.661888
      .000           .197745      .388932      .626915      .845442     1.212016     1.740726     2.767684     5.143662    13.022506
  -200.000           .182106      .343296      .530070      .690285      .938375     1.257816     1.779768     2.661422     4.074889
  -400.000           .168766      .303183      .443178      .550122      .693595      .823493     1.087761     1.440039     2.708335
  -600.000           .154584      .260745      .353657      .411486      .515642      .618541      .737824     1.155965     2.022530
  -800.000           .139907      .218181      .287651      .342576      .405981      .459324      .641625      .960547     1.420212
 -1000.000           .125081      .186092      .245489      .281155      .317405      .417079      .582381      .800418     1.037472
 -1250.000           .107528      .160596      .198804      .218325      .292467      .383995      .495048      .642579      .752934
 -1500.000           .095127      .137286      .160810      .205334      .274032      .340640      .422359      .505382      .572445
 -2000.000           .077746      .099186      .149136      .184454      .225481      .265285      .303513      .336456      .365480
 -3000.000           .050353      .088727      .116430      .132180      .149453      .161049      .172083      .182243      .191207

                                                               - GRID SYSTEM RECEPTORS -
                                                            - X AXIS (DISTANCE, METERS) -
                          .000      200.000      400.000      600.000      800.000     1000.000     1250.000     1500.000     2000.000
Y AXIS (DISTANCE          , METERS   )                             -   CONCENTRATION   -
           ------------------------------------------------------------------------------------------------------------------------

  3000.000           .109530      .106237      .101744      .096439      .090532      .084182      .076024      .068920      .057371
  2000.000           .226150      .215839      .200361      .181875      .161561      .142420      .124210      .107175      .079031
  1500.000           .379052      .355756      .318238      .273604      .231116      .198802      .162242      .132515      .130178
  1250.000           .525420      .486192      .420415      .347538      .285721      .235667      .184594      .180881      .166584
  1000.000           .781384      .706732      .577554      .448524      .353885      .277776      .267202      .253840      .209609
   800.000          1.170059     1.025948      .779998      .564292      .418369      .394483      .367660      .326109      .264368
   600.000          1.954620     1.618620     1.066844      .717416      .642060      .583774      .492226      .439963      .342652
   400.000          3.925381     2.920527     1.543253     1.253873     1.030907      .897066      .750609      .615844      .425358
   200.000         11.471585     5.483708     3.335635     2.718410     1.941765     1.435333     1.046927      .796398      .506765
      .000           .000000    25.995482    10.171692     5.114832     3.062559     2.039336     1.375513      .995872      .597055
  -200.000         12.344757     7.775622     4.910321     3.530263     2.324929     1.653154     1.171796      .874905      .544025
  -400.000          5.043224     4.389494     2.621337     1.988406     1.549731     1.272277      .962635      .752439      .491973
  -600.000          2.747707     2.521651     1.796403     1.291082     1.064409      .914706      .740086      .629156      .434382
  -800.000          1.735743     1.650743     1.328355     1.002180      .775074      .676022      .589321      .502345      .380056
 -1000.000          1.204175     1.164315      .986235      .796041      .649274      .524130      .461627      .413644      .320431
 -1250.000           .842562      .822854      .728293      .622268      .522149      .440561      .353451      .319859      .268332
 -1500.000           .626087      .614671      .559027      .490788      .423022      .370225      .308395      .256346      .222434
 -2000.000           .389287      .384241      .360114      .330799      .298044      .266134      .235324      .205748      .155218
 -3000.000           .198870      .197230      .189719      .180766      .170729      .159659      .145883      .133096      .112234
```

FIGURE D-2. (Continued)

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**** ISCLT ************                    HYPOTHETICAL POTASH PROCESSING PLANT                                    ******** PAGE    47 ****

  **   ANNUAL GROUND LEVEL CONCENTRATION ( MICROGRAMS PER CUBIC METER           ) (CONT.) FROM COMBINED SOURCES     2.    -11.
                                                          - GRID SYSTEM RECEPTORS -
                                                       - X AXIS (DISTANCE, METERS) -
                   3000.000
Y AXIS (DISTANCE        , METERS  )                              -  CONCENTRATION  -
         -------------------------------------------------------------------------------------------------------------------

    3000.000        .038524
    2000.000        .076059
    1500.000        .103859
    1250.000        .120911
    1000.000        .154987
     800.000        .182127
     600.000        .209715
     400.000        .237103
     200.000        .263547
        .000        .293381
    -200.000        .276436
    -400.000        .260690
    -600.000        .243179
    -800.000        .224515
   -1000.000        .205255
   -1250.000        .179758
   -1500.000        .160045
   -2000.000        .126144
   -3000.000        .077065
  **   ANNUAL GROUND LEVEL CONCENTRATION ( MICROGRAMS PER CUBIC METER           ) (CONT.) FROM COMBINED SOURCES     2.    -11.
                                                            - DISCRETE RECEPTORS -
   X          Y        CONCENTRATION             X          Y        CONCENTRATION              X          Y        CONCENTRATION
RANGE     AZIMUTH                             RANGE     AZIMUTH                             RANGE     AZIMUTH
          BEARING                                       BEARING                                       BEARING
(METERS) (DEGREES)                           (METERS) (DEGREES)                            (METERS) (DEGREES)
         ------------------------------------------------------------------------------------------------------------------

  2108.0       14.0       .103957
                                                 - PROGRAM DETERMINED MAXIMUM 10 VALUES -

                                                     X            Y          CONCENTRATION
                                                 COORDINATE   COORDINATE

                                                  (METERS)     (METERS )
                                                 ------------------------------------
                                                     200.00          .00       25.995482
                                                    -200.00          .00       13.022506
                                                        .00      -200.00       12.344757
                                                        .00       200.00       11.471585
                                                     400.00          .00       10.171692
                                                     200.00      -200.00        7.775622
                                                    -200.00       200.00        6.661888
                                                     200.00       200.00        5.483708
```

FIGURE D-2. (Continued)

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**** ISCLT *************               HYPOTHETICAL POTASH PROCESSING PLANT                              ******** PAGE     48 ****

 **   ANNUAL GROUND LEVEL CONCENTRATION ( MICROGRAMS PER CUBIC METER             ) (CONT.) FROM COMBINED SOURCES      2,   -11,
                                         - PROGRAM DETERMINED MAXIMUM 10 VALUES -

                                          X            Y         CONCENTRATION
                                      COORDINATE   COORDINATE

                                       (METERS)     (METERS )
                                      ----------------------------------------
                                         -400.00          .00        5.143662
                                          600.00          .00        5.114832
```

FIGURE D-2. (Continued)

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**** ISCLT *************                    HYPOTHETICAL POTASH PROCESSING PLANT                              ********* PAGE    61 ****

  **   ANNUAL GROUND LEVEL CONCENTRATION ( MICROGRAMS PER CUBIC METER            )          FROM COMBINED SOURCES    12,   -15,
                                                          - GRID SYSTEM RECEPTORS -
                                                        - X AXIS (DISTANCE, METERS) -
                     -3000.000    -2000.000    -1500.000    -1250.000    -1000.000     -800.000     -600.000     -400.000     -200.000
Y AXIS (DISTANCE         , METERS  )                                  -  CONCENTRATION  -
                 ---------------------------------------------------------------------------------------------------------------------

     3000.000         1.026136     1.256659     1.394891     1.457631     1.563327     1.627987     1.701759     1.767006     1.821674
     2000.000         1.466923     1.800774     2.041300     2.223513     2.395042     2.537323     2.765627     2.903706     3.063167
     1500.000         1.731106     2.324103     2.652226     2.855598     3.135916     3.416398     3.691384     4.125984     4.350539
     1250.000         1.961593     2.630876     3.123444     3.382038     3.688808     4.012042     4.433402     5.142713     5.395622
     1000.000         2.099291     2.970352     3.666295     4.081321     4.512064     5.064538     5.408635     6.114076     7.169499
      800.000         2.226346     3.383329     4.149426     4.717587     5.384980     5.971147     6.871447     7.476237     9.354106
      600.000         2.345510     3.654743     4.898023     5.924089     6.394051     7.333505     8.414105    10.062810    11.366325
      400.000         2.453982     3.922350     5.342118     6.397145     7.968719    10.105235    10.947987    12.959803    16.802806
      200.000         2.549123     4.149963     5.754478     6.994015     8.784849    10.846951    13.927800    19.689732    25.817279
         .000         2.723536     4.536736     6.413326     7.898811    10.100913    12.715501    16.707065    23.365372    36.872725
     -200.000         2.460799     3.924102     5.327105     6.365755     7.800076     9.345690    11.452104    15.019095    16.782434
     -400.000         2.298247     3.530168     4.613119     5.339763     6.342207     7.578035     7.639159     8.584537    12.158228
     -600.000         2.127076     3.116801     3.918625     4.507072     4.630759     5.200032     5.815339     7.605318    10.043595
     -800.000         1.950689     2.721101     3.107547     3.479133     3.900884     4.257975     5.322970     6.527227     9.933158
    -1000.000         1.772396     2.271145     2.747335     3.020561     3.292710     3.983939     4.711037     5.969658     8.443038
    -1250.000         1.578029     2.013745     2.351178     2.525096     3.004131     3.564726     4.328892     5.762002     6.770402
    -1500.000         1.353474     1.786021     2.013559     2.341790     2.828426     3.341222     3.932989     5.068898     5.703456
    -2000.000         1.153758     1.400879     1.820123     2.143614     2.501049     2.838205     3.471504     3.848852     4.256399
    -3000.000          .821929     1.233152     1.530709     1.695313     2.004370     2.176083     2.360704     2.539866     2.709668

                                                          - GRID SYSTEM RECEPTORS -
                                                        - X AXIS (DISTANCE, METERS) -
                          .000      200.000      400.000      600.000      800.000     1000.000     1250.000     1500.000     2000.000
Y AXIS (DISTANCE         , METERS  )                                  -  CONCENTRATION  -
                 ---------------------------------------------------------------------------------------------------------------------

     3000.000         1.863959     1.946157     1.864515     1.818903     1.762482     1.697084     1.606376     1.478013     1.223261
     2000.000         3.180661     3.355556     3.132769     2.977663     2.791661     2.673075     2.209653     1.934654     1.470276
     1500.000         4.606066     4.894876     4.444415     4.091908     3.818324     3.113531     2.611359     2.192930     2.121044
     1250.000         5.800642     6.193524     5.489854     5.016295     4.086707     3.458845     2.824745     2.732542     2.629033
     1000.000         7.629095     8.193368     6.996715     6.181206     4.669840     3.838446     3.638694     3.511530     3.218704
      800.000         9.929156    10.737393     8.871583     6.664326     5.216991     5.023360     4.568589     4.348115     4.215461
      600.000        13.824750    14.944345    11.830539     7.698926     7.130131     6.338229     5.861778     6.036804     5.303346
      400.000        22.679297    23.369781    13.944838    11.238172     9.460494     9.831520     9.427739     8.144196     6.402651
      200.000        39.465606    47.275865    23.402405    22.100778    18.106442    14.963064    12.224927    10.178134     7.488700
         .000        53.515590      .000000    66.329726    40.045153    28.322048    21.742420    16.524483    13.114771     9.079860
     -200.000        27.318790    47.661745    32.539129    27.707600    21.103718    16.725171    13.385482    10.986314     7.935629
     -400.000        21.760216    26.873203    20.514912    17.591312    13.690922    13.148636    11.531110     9.444956     7.134890
     -600.000        15.240582    18.927883    17.715207    12.722244    11.843365     9.675957     8.441639     8.051563     6.285479
     -800.000        11.875368    14.511469    13.200067    10.997480     9.195337     8.678366     7.162165     6.429449     5.595544
    -1000.000         9.656154    11.554809    10.533226    10.268062     8.149261     7.032344     6.321995     5.610717     4.655951
    -1250.000         7.726638     9.057635     8.443438     8.202712     7.085935     6.242832     5.344371     4.888875     4.100524
    -1500.000         6.366639     7.341380     6.947709     6.658505     6.613816     5.568666     4.863932     4.241057     3.597720
    -2000.000         4.625996     5.207078     5.014265     4.898679     4.726667     4.731584     4.031366     3.636089     2.926842
    -3000.000         2.866272     3.131571     3.063723     3.039350     2.995852     2.935314     2.840997     2.700475     2.323698
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FIGURE D-2. (Continued)

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**** ISCLT *************                    HYPOTHETICAL POTASH PROCESSING PLANT                          ******** PAGE     62 ****

 **   ANNUAL GROUND LEVEL CONCENTRATION ( MICROGRAMS PER CUBIC METER            ) (CONT.) FROM COMBINED SOURCES     12,    -15,
                                                          - GRID SYSTEM RECEPTORS -
                                                        - X AXIS (DISTANCE, METERS) -
                         3000.000
Y AXIS (DISTANCE           , METERS   )                              -  CONCENTRATION  -
          --------------------------------------------------------------------------------------------------------------------------

    3000.000         .830907
    2000.000        1.458025
    1500.000        1.929534
    1250.000        2.299519
    1000.000        2.907767
     800.000        3.351531
     600.000        3.801683
     400.000        4.248753
     200.000        4.684326
        .000        5.339422
    -200.000        4.870247
    -400.000        4.557828
    -600.000        4.226481
    -800.000        3.881844
   -1000.000        3.532636
   -1250.000        3.102986
   -1500.000        2.771852
   -2000.000        2.339535
   -3000.000        1.705054
 **   ANNUAL GROUND LEVEL CONCENTRATION ( MICROGRAMS PER CUBIC METER            ) (CONT.) FROM COMBINED SOURCES     12,    -15,
                                                          - DISCRETE RECEPTORS -
   X          Y        CONCENTRATION           X          Y        CONCENTRATION           X          Y        CONCENTRATION
RANGE      AZIMUTH                          RANGE      AZIMUTH                          RANGE      AZIMUTH
           BEARING                                     BEARING                                     BEARING
(METERS) (DEGREES)                        (METERS) (DEGREES)                          (METERS) (DEGREES)
         -------------------------------------------------------------------------------------------------------------------------

  2108.0        14.0      2.969893
                                              - PROGRAM DETERMINED MAXIMUM 10 VALUES -

                                                   X            Y            CONCENTRATION
                                              COORDINATE   COORDINATE


                                               (METERS)     (METERS )
                                              --------------------------------------------
                                                 400.00          .00          66.329726
                                                    .00          .00          53.515590
                                                 200.00      -200.00          47.661745
                                                 200.00       200.00          47.275865
                                                 600.00          .00          40.045153
                                                    .00       200.00          39.465606
                                                -200.00          .00          36.872725
                                                 400.00      -200.00          32.539129
```

FIGURE D-2. (Continued)

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**** ISCLT *************                HYPOTHETICAL POTASH PROCESSING PLANT                        ******** PAGE     63 ****

 **   ANNUAL GROUND LEVEL CONCENTRATION ( MICROGRAMS PER CUBIC METER            ) (CONT ) FROM COMBINED SOURCES     12,   -15,
                                          - PROGRAM DETERMINED MAXIMUM 10 VALUES -

                                            X           Y          CONCENTRATION
                                        COORDINATE   COORDINATE

                                         (METERS)     (METERS )
                                        ---------------------------------------
                                           800.00          .00        28.322048
                                           600.00      -200.00        27.707600
```

FIGURE D-2. (Continued)

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**** ISCLT *************                    HYPOTHETICAL POTASH PROCESSING PLANT                                     ******** PAGE    64 ****

      **   ANNUAL GROUND LEVEL CONCENTRATION ( MICROGRAMS PER CUBIC METER            ) DUE TO SOURCE    16          **
                                                       - GRID SYSTEM RECEPTORS -
                                                     - X AXIS (DISTANCE, METERS) -
                       -3000.000     -2000.000     -1500.000     -1250.000     -1000.000      -800.000      -600.000      -400.000      -200.000
 Y AXIS (DISTANCE          , METERS   )                                 -   CONCENTRATION   -
                 ------------------------------------------------------------------------------------------------------------------------------

      3000.000       .194004       .221657       .239433       .247235       .254435       .262541       .269747       .275774       .280398
      2000.000       .281036       .310754       .336798       .360002       .382670       .399868       .415452       .435677       .451749
      1500.000       .335371       .405118       .433513       .444328       .489170       .526191       .562198       .594928       .633081
      1250.000       .360168       .460572       .512590       .535127       .554654       .609338       .665930       .720418       .774594
      1000.000       .377567       .520193       .602659       .646679       .687935       .713953       .791536       .882721       .969637
       800.000       .390555       .552199       .680728       .747237       .818264       .873123       .917873      1.037033      1.174189
       600.000       .402395       .576033       .732679       .844893       .962786      1.058602      1.152606      1.225331      1.402100
       400.000       .412803       .596225       .765492       .889606      1.056087      1.232746      1.427465      1.586036      1.659714
       200.000       .421518       .611690       .789244       .921203      1.100662      1.293867      1.548208      1.879582      2.270847
          .000       .423332       .611709       .785811       .914316      1.087988      1.273403      1.513868      1.815784      2.143195
      -200.000       .395189       .551024       .682661       .771395       .878517       .974330      1.064028      1.103452      1.125793
      -400.000       .366032       .488265       .577210       .627439       .673775       .703664       .753437       .772306       .796501
      -600.000       .336429       .425877       .475794       .501191       .541682       .567717       .577487       .595761       .898089
      -800.000       .306922       .366235       .406702       .431442       .450636       .456006       .469597       .651580       .894145
     -1000.000       .278000       .323930       .357381       .369925       .374564       .384470       .504026       .657576       .831954
     -1250.000       .243286       .286388       .303272       .305440       .329684       .410856       .510831       .630068       .722378
     -1500.000       .221409       .252344       .257741       .274781       .345733       .415062       .496171       .581122       .634170
     -2000.000       .187246       .197315       .244985       .290844       .343994       .392588       .441475       .474940       .507454
     -3000.000       .134165       .193603       .242297       .269890       .297660       .315132       .332617       .349789       .366258

                                                       - GRID SYSTEM RECEPTORS -
                                                     - X AXIS (DISTANCE, METERS) -
                            .000       200.000       400.000       600.000       800.000      1000.000      1250.000      1500.000      2000.000
 Y AXIS (DISTANCE          , METERS   )                                 -   CONCENTRATION   -
                 ------------------------------------------------------------------------------------------------------------------------------

      3000.000       .283491       .284907       .271753       .257521       .242637       .227376       .208265       .190677       .162882
      2000.000       .462313       .466332       .429879       .389362       .347176       .305361       .268491       .235949       .182986
      1500.000       .659417       .669958       .595406       .512386       .428690       .370863       .308809       .257612       .249967
      1250.000       .818392       .836790       .720934       .594414       .486725       .406751       .324505       .288574       .312398
      1000.000      1.041270      1.072030       .880379       .681819       .544358       .432877       .371240       .394078       .386547
       800.000      1.278540      1.315341      1.018746       .757506       .571548       .459607       .501359       .499818       .453586
       600.000      1.573095      1.562778      1.116103       .783714       .600277       .668601       .665932       .624119       .576280
       400.000      1.808802      1.626612      1.058815       .786152       .952365       .949090       .908945       .850985       .715501
       200.000      1.996482       .863316      1.020365      1.497748      1.587248      1.479771      1.288151      1.113102       .857957
          .000      1.755319       .000000      2.528528      2.791865      2.325415      1.944634      1.576370      1.306923       .961991
      -200.000      1.193126      2.252425      1.583050      1.667326      1.622603      1.492254      1.298919      1.124264       .867565
      -400.000      1.384831      1.850429      1.410742      1.074860      1.123357      1.113601      1.027570       .937561       .768489
      -600.000      1.243651      1.461610      1.209373       .989275       .817340       .833911       .824230       .776081       .670454
      -800.000      1.072584      1.204016      1.045214       .889018       .759827       .648773       .657124       .647550       .584810
     -1000.000       .930513      1.018421       .911855       .797718       .699548       .611148       .525433       .539176       .515255
     -1250.000       .790686       .849445       .779938       .702978       .629152       .563295       .488770       .431337       .439065
     -1500.000       .683910       .726404       .678221       .624302       .569258       .518973       .460522       .408699       .375589
     -2000.000       .537515       .563653       .537420       .508243       .477717       .447202       .409731       .374486       .313068
     -3000.000       .381712       .395810       .385304       .373903       .361932       .349531       .333880       .317808       .280590
```

FIGURE D-2. (Continued)

```
**** ISCLT ************                    HYPOTHETICAL POTASH PROCESSING PLANT                              ******** PAGE    65 ****

      **   ANNUAL GROUND LEVEL CONCENTRATION ( MICROGRAMS PER CUBIC METER              ) DUE TO SOURCE     16 (CONT ) **
                                                  - GRID SYSTEM RECEPTORS -
                                                - X AXIS (DISTANCE, METERS) -
                   3000.000
Y AXIS (DISTANCE      , METERS  )                          -  CONCENTRATION  -
              ---- ----------------------------------------------------------------------------------------------------

     3000 000        .118448
     2000 000        .194403
     1500 000        .256078
     1250 000        .291362
     1000 000        .352144
      800 000        .410139
      600 000        .470634
      400 000        .532378
      200 000        .593907
          000        .639122
     -200 000        .599341
     -400 000        .557884
     -600 000        .515798
     -800 000        .474085
    -1000.000        .433613
    -1250 000        .390244
    -1500 000        .355025
    -2000 000        .293978
    -3000 000        .220755

      **   ANNUAL GROUND LEVEL CONCENTRATION ( MICROGRAMS PER CUBIC METER              ) DUE TO SOURCE     16 (CONT ) **
                                                     - DISCRETE RECEPTORS -
    X          Y      CONCENTRATION            X          Y      CONCENTRATION            X          Y      CONCENTRATION
 RANGE     AZIMUTH                          RANGE     AZIMUTH                          RANGE     AZIMUTH
           BEARING                                    BEARING                                    BEARING
(METERS) (DEGREES)                         (METERS) (DEGREES)                         (METERS) (DEGREES)
          -------------------------------------------------------------------------------------------------------------

   2108 0       14.0        .398237
                  - 10 CONTRIBUTING VALUES TO PROGRAM DETERMINED MAXIMUM 10 OF COMBINED SOURCES     16.

                                            X            Y          CONCENTRATION
                                       COORDINATE   COORDINATE

                                        (METERS)     (METERS )
                                       ----------------------------------------
                                          600.00          .00          2.791865
                                          400.00          .00          2.528528
                                          800.00          .00          2.325415
                                         -200.00       200.00          2.270847
                                          200.00      -200.00          2.252425
                                         -200 00          .00          2.143195
                                             .00       200.00          1.996482
                                         1000.00          .00          1.944634
```

FIGURE D-2. (Continued)

```
**** ISCLT *************                 HYPOTHETICAL POTASH PROCESSING PLANT                              ******** PAGE     66 ****

     **   ANNUAL GROUND LEVEL CONCENTRATION ( MICROGRAMS PER CUBIC METER              ) DUE TO SOURCE     16 (CONT.)  **
              - 10 CONTRIBUTING VALUES TO PROGRAM DETERMINED MAXIMUM 10 OF COMBINED SOURCES     16.

                                                  X            Y          CONCENTRATION
                                              COORDINATE   COORDINATE

                                               (METERS)     (METERS )
                                              ------------------------------------------
                                                -400.00       200.00        1.879582
                                                 200.00      -400.00        1.850429
```

FIGURE D-2. (Continued)

```
**** ISCLT *************                    HYPOTHETICAL POTASH PROCESSING PLANT                          ******** PAGE     68 ****

     **   ANNUAL GROUND LEVEL CONCENTRATION ( MICROGRAMS PER CUBIC METER             ) DUE TO SOURCE       2          **
              - 10 CONTRIBUTING VALUES TO PROGRAM DETERMINED MAXIMUM 10 OF COMBINED SOURCES    -16.

                                         X            Y          CONCENTRATION
                                     COORDINATE   COORDINATE

                                      (METERS)     (METERS )
                                     ----------------------------------------
                                        200.00          .00          3.850015
                                       -200.00          .00          2.154006
                                           .00      -200.00          2.098428
                                           .00       200.00          1.573416
                                       -200.00       200.00           .904135
                                        400.00          .00          1.056811
                                        200.00      -200.00          1.020814
                                       -400.00          .00           .672045
                                           .00      -400.00           .647180
                                       -200.00      -200.00           .600412
```

FIGURE D-2. (Continued)

```
**** ISCLT *************                    HYPOTHETICAL POTASH PROCESSING PLANT                              ********* PAGE     83 ****

 **    ANNUAL GROUND LEVEL CONCENTRATION ( MICROGRAMS PER CUBIC METER                )          FROM COMBINED SOURCES    -16.
                                                            - GRID SYSTEM RECEPTORS -
                                                         - X AXIS (DISTANCE, METERS) -
                        -3000.000     -2000.000     -1500.000     -1250.000     -1000.000      -800.000      -600.000      -400.000      -200.000
 Y AXIS (DISTANCE          , METERS  )                                      -  CONCENTRATION  -
                ------------------------------------------------------------------------------------------------------------------------

     3000.000          16.522560     20.160159     21.849217     22.740114     23.336577     23.996981     24.485956     24.758325     24.782160
     2000.000          26.958198     33.179968     38.284207     41.374827     43.980347     45.541280     47.898315     49.569026     50.290810
     1500.000          33.918464     47.329058     54.780899     59.149200     66.224823     71.324417     75.959636     80.273409     83.069705
     1250.000          38.412107     56.544346     68.311043     75.407299     82.864464     92.192979    100.215822    107.824919    113.815068
     1000.000          40.413695     66.823286     86.698893     97.840737    111.656610    121.614747    130.612764    156.879406    166.467819
      800.000          42.044022     76.222681    103.646181    122.274283    142.806354    165.316082    184.331835    215.923487    243.798899
      600.000          43.397894     81.332103    124.363353    150.648001    187.156818    222.697435    277.385811    324.584450    387.867008
      400.000          44.419919     85.491516    134.167921    176.338940    247.445614    309.382069    410.113197    577.675323    715.203056
      200.000          45.045175     88.123725    141.474094    199.028994    270.556961    387.608900    601.872719    969.667404   1818.115005
         .000          45.916060     90.855263    147.833048    200.956566    291.966961    430.300426    703.689262   1352.809540   3337.469910
     -200.000          41.941657     79.167438    122.753387    160.397211    219.170832    298.322762    425.008644    580.423660   1153.095627
     -400.000          38.781127     69.568884    101.733862    126.159304    161.640333    191.628498    253.665527    386.510540    720.739624
     -600.000          35.423207     59.455864     88.884219     94.237838    117.665745    140.937147    188.328789    300.150852    506.806213
     -800.000          31.959581     49.455644     65.387279     77.841969     92.060918    113.272001    161.584404    240.140980    342.427147
    -1000.000          28.468305     42.223666     55.721813     63.718297     77.115408    103.280412    143.309587    204.339903    245.944628
    -1250.000          24.435443     36.440951     45.070771     52.459734     71.392230     93.546669    120.225656    153.213083    177.021231
    -1500.000          21.614428     31.172742     38.344536     49.714458     66.338199     82.376281    104.846945    120.066515    134.181208
    -2000.000          17.722775     23.487793     35.790456     44.326645     54.186901     64.290197     72.215261     79.405753     85.625255
    -3000.000          11.883859     21.238550     27.929014     32.354536     35.690644     38.310328     40.792690     43.055383     45.017385

                                                            - GRID SYSTEM RECEPTORS -
                                                         - X AXIS (DISTANCE, METERS) -
                            .000       200.000       400.000       600.000       800.000      1000.000      1250.000      1500.000      2000.000
 Y AXIS (DISTANCE          , METERS  )                                      -  CONCENTRATION  -
                ------------------------------------------------------------------------------------------------------------------------

     3000.000          24.934721     23.571416     22.418600     21.153652     19.770863     18.307478     16.611444     15.029985     12.590498
     2000.000          51.044839     46.689535     42.853902     38.566743     34.057716     30.301922     26.398673     22.911182     17.814389
     1500.000          85.323865     75.402963     66.349194     56.865574     48.154256     41.365995     34.022812     29.530576     28.371988
     1250.000         118.260000    101.545734     86.002648     69.695181     58.469010     48.517578     40.824563     39.483169     35.756058
     1000.000         176.255377    144.608702    117.674806     90.298018     71.272028     60.850049     57.530650     53.891436     44.377848
      800.000         265.419224    204.942654    147.746462    110.826845     90.742807     84.355561     76.925032     67.999671     56.067525
      600.000         448.012074    310.452656    203.379015    153.407358    134.422354    119.704184    100.642008     92.291634     72.052589
      400.000         912.388756    478.954720    322.845631    253.581755    204.092562    186.288324    153.029696    126.139023     88.579032
      200.000        2562.897095   1029.417297    622.918434    515.864479    374.822460    281.017220    208.461252    160.870254    104.817677
         .000          55.270909   3798.396332   1726.385315    923.690369    573.291183    392.786240    271.619366    200.277052    123.388295
     -200.000        2906.768219   1547.785400    937.824738    664.755905    452.524174    326.619911    235.455381    178.258224    113.350881
     -400.000        1285.670700    739.281395    543.440018    403.554119    312.938114    264.315540    199.290188    156.385298    103.790063
     -600.000         685.900635    492.058418    343.738201    268.919758    221.761490    190.024277    155.398756    133.470195     93.027099
     -800.000         424.745869    335.826340    249.626593    195.105984    163.048063    143.227644    124.685884    107.228083     82.029533
    -1000.000         290.583519    242.774803    200.087950    158.710787    128.845993    111.262972     98.672390     88.704962     69.799262
    -1250.000         201.698225    175.445150    149.232218    122.841108    105.365843     89.149122     75.783270     69.148563     58.552079
    -1500.000         149.285406    133.216473    117.351745    100.907719     86.913419     75.801771     63.460796     55.435775     48.621592
    -2000.000          92.565078     85.188810     78.070786     70.190881     61.989390     55.721600     49.148626     43.154763     34.004495
    -3000.000          47.354122     44.910047     42.603978     40.087975     37.376537     34.535759     31.274437     28.488787     24.147583
```

FIGURE D-2. (Continued)

```
**** ISCLT *************                 HYPOTHETICAL POTASH PROCESSING PLANT                               ******** PAGE    84 ****

 **   ANNUAL GROUND LEVEL CONCENTRATION ( MICROGRAMS PER CUBIC METER           ) (CONT.) FROM COMBINED SOURCES    -16.
                                                   - GRID SYSTEM RECEPTORS -
                                                 - X AXIS (DISTANCE, METERS) -
                    3000.000
Y AXIS (DISTANCE          , METERS  )                       -  CONCENTRATION  -
         --------------------------------------------------------------------------------------------------------------

   3000.000       8.834398
   2000.000      16.775850
   1500.000      22.556462
   1250.000      26.794475
   1000.000      33.573967
    800.000      39.237078
    600.000      44.978824
    400.000      50.676871
    200.000      56.187906
       .000      62.604568
   -200.000      59.255091
   -400.000      56.257470
   -600.000      52.889976
   -800.000      49.264845
  -1000.000      45.478456
  -1250.000      40.940317
  -1500.000      35.812128
  -2000.000      28.217005
  -3000.000      17.219220
 **   ANNUAL GROUND LEVEL CONCENTRATION ( MICROGRAMS PER CUBIC METER           ) (CONT.) FROM COMBINED SOURCES    -16.
                                                   - DISCRETE RECEPTORS -
    X          Y       CONCENTRATION             X         Y        CONCENTRATION             X          Y        CONCENTRATION
 RANGE     AZIMUTH                            RANGE     AZIMUTH                            RANGE     AZIMUTH
           BEARING                                      BEARING                                      BEARING
 (METERS) (DEGREES)                          (METERS) (DEGREES)                           (METERS) (DEGREES)
         --------------------------------------------------------------------------------------------------------------

   2108.0       14.0     39.230495
                                              - PROGRAM DETERMINED MAXIMUM 10 VALUES -

                                                   X             Y          CONCENTRATION
                                              COORDINATE    COORDINATE

                                               (METERS)      (METERS )
                                              ------------------------------------------
                                                  200.00           .00     3798.396332
                                                 -200.00           .00     3337.469910
                                                     .00       -200.00     2906.768219
                                                     .00        200.00     2562.897095
                                                 -200.00        200.00     1818.115005
                                                  400.00           .00     1726.385315
                                                  200.00       -200.00     1547.785400
                                                 -400.00           .00     1352.809540
```

FIGURE D-2. (Continued)

```
**** ISCLT *************             HYPOTHETICAL POTASH PROCESSING PLANT
                                                                                          ******** PAGE    85 ****

 **   ANNUAL GROUND LEVEL CONCENTRATION ( MICROGRAMS PER CUBIC METER          ) (CONT.) FROM COMBINED SOURCES    -16.
                                  - PROGRAM DETERMINED MAXIMUM 10 VALUES -

                                       X           Y
                                   COORDINATE  COORDINATE     CONCENTRATION

                                   (METERS)    (METERS )
                                  ----------------------------------------
                                         .00     -400.00     1205.670700
                                     -200.00     -200.00     1153.095627
```

FIGURE D-2. (Continued)

```
**** ISCLT *************                 HYPOTHETICAL POTASH PROCESSING PLANT                       ******** PAGE    86 ****
                                         - SUMMARY OF SOURCES OUTPUT TO TAPE -

NUMBER/TYPE NUMBER/TYPE NUMBER/TYPE NUMBER/TYPE NUMBER/TYPE NUMBER/TYPE NUMBER/TYPE NUMBER/TYPE NUMBER/TYPE NUMBER/TYPE NUMBER/TYPE
    1  2        2  1        3  1        4  1        5  1        6  1        7  1        8  1        9  1       10  1       11  1
   12  1       13  1       14  1       15  1       16  0
```

FIGURE D-2. (Continued)

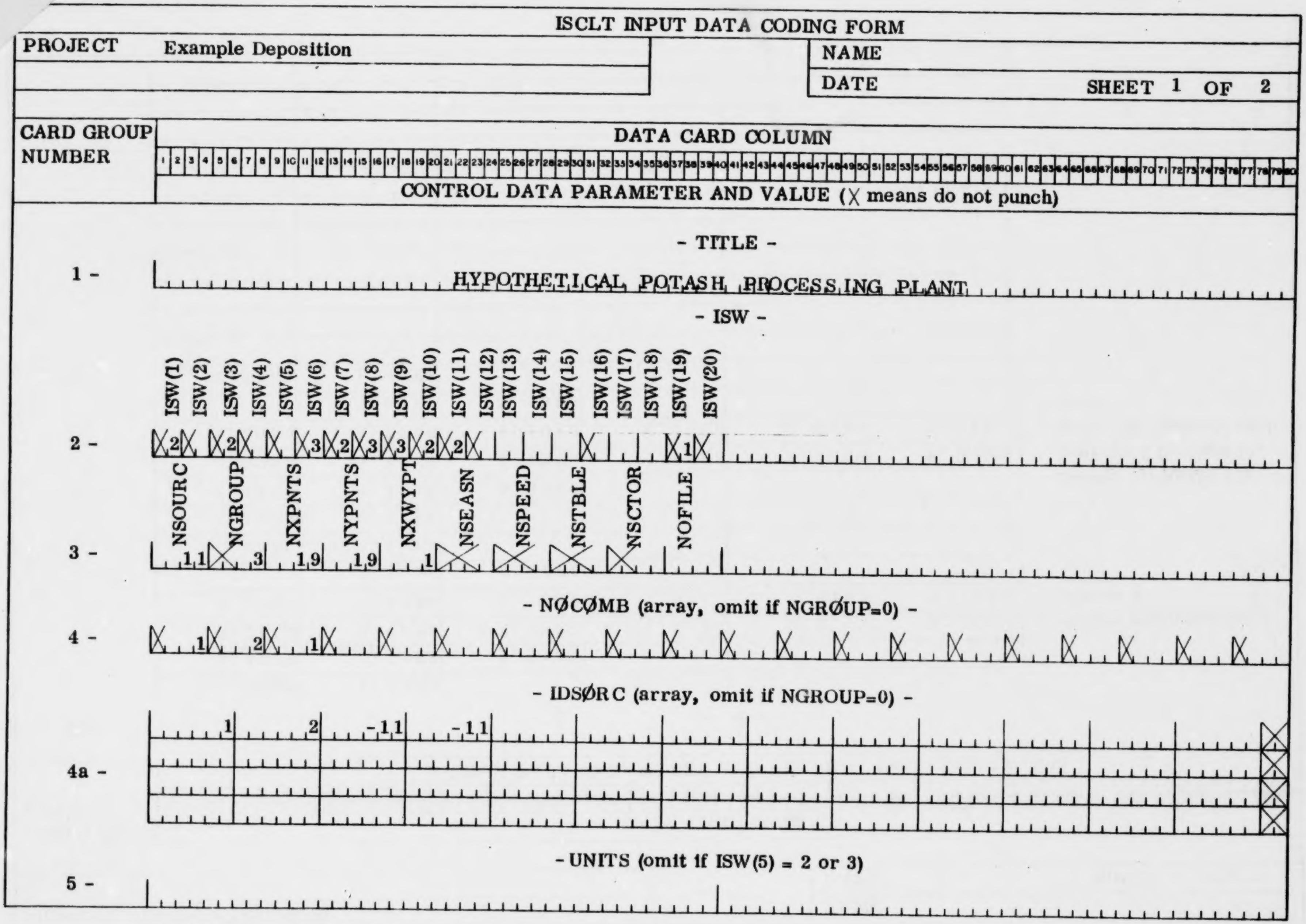
are from pages 46 through 48 of the output listing. These pages show the combined particulate concentrations for Sources 2 through 11 with the maximum 10 values and receptors for the combined Sources 2 through 11. Figure D-2 continues with output pages 61 through 63 showing the combined source output for Sources 12 through 15. The output for Source 16 is shown on pages 64 through 66. The ISCLT program then continues to print the 10 values from each of Sources 1 through 16 that contribute to the maximum 10 of all 16 sources combined (only Source 2 is shown). The program only displays the 10 values that contribute to the maximum 10 because the calculations for all receptor points for each source have been displayed earlier in the output listing. The output listing for this example is terminated on output page 86 with a summary of the source ID-number and source type of each source output to tape with the respective calculated concentrations.

D.3 EXAMPLE DRY DEPOSITION RUN

This ISCLT program example run calculates the total annual ground-level dry deposition from the same hypothetical potash processing plant described in Section D.2. This particular example is modeled using 11 out of the original 16 sources. Only the first 11 sources are used here because Sources 12 through 16 are assumed to be emitting only submicron particulates that are assumed to be completely reflected at the ground surface and thus do not contribute to the ground level deposition.

D.3.1 Input Data Set-Up Procedure

The input card data set-up procedure for this example is the same as that used in Section D.2 for the example concentration run. The data parameters that are different from those used in the concentration example are shown in Figure D-3. Card Groups 1 and 5 in Figure D-3 are the same as those



ISCLT INPUT DATA CODING FORM

PROJECT Example Deposition

NAME

DATE

SHEET 1 OF 2

CARD GROUP NUMBER

DATA CARD COLUMN

CONTROL DATA PARAMETER AND VALUE (X means do not punch)

- TITLE -

1 - HYPOTHETICAL POTASH PROCESSING PLANT

- ISW -

	ISW(1)	ISW(2)	ISW(3)	ISW(4)	ISW(5)	ISW(6)	ISW(7)	ISW(8)	ISW(9)	ISW(10)	ISW(11)	ISW(12)	ISW(13)	ISW(14)	ISW(15)	ISW(16)	ISW(17)	ISW(18)	ISW(19)	ISW(20)
2 -	X2	X	X2	X	X	X3	X2	X3	X3	X2	X2	X				X			X1	X

	NSOURC	NGROUP	NXPNTS	NYPNTS	NXWYPT	NSEASN	NSPEED	NSTBLE	NSCTOR	NOFILE
3 -	11	X 3	19	19	1	X	X	X	X	

- NØCØMB (array, omit if NGRØUP=0) -

4 - X 1 X 2 X 1 X X X X X X X X X X X X X X X X X

- IDSØRC (array, omit if NGROUP=0) -

4a - 1 2 -11 -11 X X X X

- UNITS (omit if ISW(5) = 2 or 3)

5 -

FIGURE D-3. Coding form for the example deposition run.

ISCLT INPUT DATA CODING FORM (Continued)

PROJECT Example Deposition

NAME

DATE SHEET 2 OF 2

CARD GROUP NUMBER

DATA CARD COLUMN

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80

SOURCE DATA PARAMETER AND VALUE (X means do not punch)

17d -

- Q -

1.26E7	1.58E7				
9.46E6	1.26E7	1.58E7			
6.31E6	9.46E6	1.26E7	1.58E7	2.21E7	3.15E7
3.15E7	7.88E6	1.26E7	1.58E7	2.21E7	3.15E7
	6.31E6	9.46E6			
1.58E6	3.15E6				
4.10E6	5.05E6				
3.15E6	4.10E6	5.05E6			
2.52E6	3.78E6	4.42E6	5.05E6	5.99E6	6.94E6
1.26E6	3.15E6	4.10E6	5.05E6	5.99E6	6.94E6
	2.52E6	3.15E6			
6.31E5	1.58E6				

source strengths for source 1

source strengths for sources 2 through 11, make 10 copies of each card

RE D-3. (Continued)

in Figure D-1 and are shown here for completeness. The parameters ISW(1) and ISW(5) on Card Group 2 are changed to the values "2" and "1", respectively, indicating deposition is to be calculated and no output tape is used. Card Groups 3 through 4a show the number of input sources (NSOURC), which is reduced to 11, and the number of output source combinations (NGROUP), which is reduced to 3. Also, Card Group 17d shows the new emission rates for Sources 1 through 11 for deposition calculations. The only other change in the input deck is the removal of Card Groups 17 through 17d for Sources 12 through 16.

D.3.2 Run Time, Required Data Storage and Page Output Estimates

The run time, data storage and page output estimates calculated for the example deposition run are given in the following paragraphs.

a. Run Time - The run time calculated using Equation (4-6) is approximately

$$\begin{aligned}\text{Time (seconds)} &\simeq 11 \cdot (19 \cdot 19+1) \cdot 1 \cdot 6 \cdot 6 \cdot 7 \cdot 7\text{x}10^{-4} \\ &\simeq 702\end{aligned} \qquad \text{(D-9)}$$

or approximately 12 minutes. The actual run time for this problem was 9 minutes.

b. Required Data Storage - This example run uses the same receptor grid system as used in the concentration example and from Section D.2.2.b. we know that the receptor points will fit in the ISCLT program. We therefore need examine only Conditions a, b and c under ISW(11) and NGROUP in Section 4.1.2. Because tape input/output is not being used in this example, we must comply with Equation (4-1) or (4-2) under Condition c of ISW(11) or NGROUP. Condition c states that the total number of sources for which concentration or deposition is to be calculated must be less than or equal to the minimum of I and J, where J = 300, and

$$I = \frac{\left(40000-(19+19+2\cdot 1) - \left[1\cdot(19\cdot 19+1)\right] - 0\right)}{(1\cdot(19\cdot 19+1))} \qquad \text{(D-10)}$$

$$= 109$$

Thus, the number of sources being used (11) is well within the program limitations.

c. Page Output - The page output estimate is calculated using Equation (4-8) in Section 4.2.5. The main difference between the page output of this example and the concentration example in Section D.2 is the reduction in the number of sources from 16 to 11. This difference would require a new estimate of Equation (4-10) giving

$$B \simeq 1\cdot(11+2)\cdot\left(\left[\frac{\frac{19}{9}\cdot(19+11)}{57}\right] + \left[\frac{1}{3\cdot(57-11)}\right] + 1\right) \qquad \text{(D-11)}$$

$$\simeq 52$$

As in the concentration example, we should add 11 more pages to B because we are producing maximum 10 tables of deposition for individual sources that contribute to combined sources maximum 10 deposition tables. This gives the total estimated output pages as

$$\text{pages} \simeq 32+53+5$$

$$\simeq 90$$

The actual number of pages output was 68, with 6 pages of system generated paper and 62 pages produced by the deposition run.

D.3.3 Example Print Output

Figure D-4 illustrates the printed deposition output for the example hypothetical potash plant. As in Figure D-2, only selected pages of output are presented here. The example output shows the annual ground-level deposition in grams per square meter due to Source 1 and due to Sources 2 through 11 combined. The listing is the same in form as that shown for the concentration calculations in Figure D-2.

```
**** ISCLT *************                 HYPOTHETICAL POTASH PROCESSING PLANT                             ******** PAGE      1 ****
                                              - ISCLT INPUT DATA -
           NUMBER OF SOURCES =  11
           NUMBER OF X AXIS GRID SYSTEM POINTS =    19
           NUMBER OF Y AXIS GRID SYSTEM POINTS =    19
           NUMBER OF SPECIAL POINTS =     1
           NUMBER OF SEASONS =    1
           NUMBER OF WIND SPEED CLASSES =    6
           NUMBER OF STABILITY CLASSES =    6
           NUMBER OF WIND DIRECTION CLASSES =  16
           FILE NUMBER OF DATA FILE USED FOR REPORTS =    1
           THE PROGRAM IS RUN IN RURAL MODE
           CONCENTRATION (DEPOSITION) UNITS CONVERSION FACTOR =  .1000000+01
           ACCELERATION OF GRAVITY (METERS/SEC**2) =  9.800
           HEIGHT OF MEASUREMENT OF WIND SPEED (METERS) =  10.000
           ENTRAINMENT PARAMETER FOR UNSTABLE CONDITIONS =  .600
           ENTRAINMENT PARAMETER FOR STABLE CONDITIONS =  .600
           CORRECTION ANGLE FOR GRID SYSTEM VERSUS DIRECTION DATA NORTH (DEGREES) =     .000
           DECAY COEFFICIENT =  .00000000
           PROGRAM OPTION SWITCHES = 2, 1, 2, 0, 0, 3, 2, 3, 3, 2, 2, 0, 0, 0, 0, 0, 0, 0, 1, 0,
           SOURCES USED TO FORM SOURCE COMBINATION  1 ARE -      1,
           SOURCES USED TO FORM SOURCE COMBINATION  2 ARE -      2,   -11,
           SOURCES USED TO FORM SOURCE COMBINATION  3 ARE -   -11,
         DISTANCE X AXIS GRID SYSTEM POINTS (METERS )=   -3000.00,   -2000.00,   -1500.00,   -1250.00,   -1000.00,    -800.00,
              -600.00,    -400.00,    -200.00,          .00,      200.00,      400.00,      600.00,      800.00,    1000.00,    1250.00,
              1500.00,    2000.00,    3000.00,
            RANGE X SPECIAL DISCRETE POINTS (METERS )=    2100.00,
         DISTANCE Y AXIS GRID SYSTEM POINTS (METERS )=   -3000.00,   -2000.00,   -1500.00,   -1250.00,   -1000.00,    -800.00,
              -600.00,    -400.00,    -200.00,          .00,      200.00,      400.00,      600.00,      800.00,    1000.00,    1250.00,
              1500.00,    2000.00,    3000.00,
     AZIMUTH BEARING Y SPECIAL DISCRETE POINTS (DEGREES)=      14.00,
                            - AMBIENT AIR TEMPERATURE (DEGREES KELVIN) -

                       STABILITY  STABILITY  STABILITY  STABILITY  STABILITY  STABILITY
                       CATEGORY 1 CATEGORY 2 CATEGORY 3 CATEGORY 4 CATEGORY 5 CATEGORY 6
           SEASON  1    287.2000   287.2000   283.2000   280.8000   279.1000   279.1000
                                   - MIXING LAYER HEIGHT (METERS) -

                                                  SEASON 1
                          WIND SPEED   WIND SPEED   WIND SPEED   WIND SPEED   WIND SPEED   WIND SPEED
                          CATEGORY 1   CATEGORY 2   CATEGORY 3   CATEGORY 4   CATEGORY 5   CATEGORY 6
     STABILITY CATEGORY 1  .173000+04   .173000+04   .173000+04   .173000+04   .173000+04   .173000+04
     STABILITY CATEGORY 2  .173000+04   .173000+04   .173000+04   .173000+04   .173000+04   .173000+04
     STABILITY CATEGORY 3  .960000+03   .102500+04   .123500+04   .129500+04   .129500+04   .129500+04
     STABILITY CATEGORY 4  .320000+03   .500000+03   .840000+03   .840000+03   .840000+03   .840000+03
     STABILITY CATEGORY 5  .100000+05   .100000+05   .100000+05   .100000+05   .100000+05   .100000+05
     STABILITY CATEGORY 6  .100000+05   .100000+05   .100000+05   .100000+05   .100000+05   .100000+05
```

FIGURE D-4. Total Annual Particulate Deposition Output Listing.

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**** ISCLT *************                  HYPOTHETICAL POTASH PROCESSING PLANT                          ******** PAGE      2 ****

                                                  - ISCLT INPUT DATA (CONT.) -

                              - FREQUENCY OF OCCURRENCE OF WIND SPEED, DIRECTION AND STABILITY -
                                                           SEASON 1
                                                    STABILITY CATEGORY 1

                        WIND SPEED  WIND SPEED  WIND SPEED  WIND SPEED  WIND SPEED  WIND SPEED
                        CATEGORY 1  CATEGORY 2  CATEGORY 3  CATEGORY 4  CATEGORY 5  CATEGORY 6
          DIRECTION    (  .7500MPS)( 2.5000MPS)( 4.3000MPS)( 6.8000MPS)( 9.5000MPS)(12.5000MPS)
         (DEGREES)
                 000     .00016950   .00008560   .00000000   .00000000   .00000000   .00000000
              22 500     .00012830   .00019980   .00000000   .00000000   .00000000   .00000000
              45 000     .00009180   .00019980   .00000000   .00000000   .00000000   .00000000
              67 500     .00010760   .00025690   .00000000   .00000000   .00000000   .00000000
              90 000     .00031190   .00059950   .00000000   .00000000   .00000000   .00000000
             112 500     .00036110   .00051390   .00000000   .00000000   .00000000   .00000000
             135 000     .00038650   .00034260   .00000000   .00000000   .00000000   .00000000
             157 500     .00069530   .00079930   .00000000   .00000000   .00000000   .00000000
             180 000     .00067470   .00085640   .00000000   .00000000   .00000000   .00000000
             202 500     .00055120   .00054240   .00000000   .00000000   .00000000   .00000000
             225 000     .00014410   .00025690   .00000000   .00000000   .00000000   .00000000
             247 500     .00011550   .00028550   .00000000   .00000000   .00000000   .00000000
             270 000     .00028990   .00025690   .00000000   .00000000   .00000000   .00000000
             292 500     .00008390   .00017130   .00000000   .00000000   .00000000   .00000000
             315 000     .00006020   .00008560   .00000000   .00000000   .00000000   .00000000
             337 500     .00028200   .00022840   .00000000   .00000000   .00000000   .00000000
                                                           SEASON 1
                                                    STABILITY CATEGORY 2

                        WIND SPEED  WIND SPEED  WIND SPEED  WIND SPEED  WIND SPEED  WIND SPEED
                        CATEGORY 1  CATEGORY 2  CATEGORY 3  CATEGORY 4  CATEGORY 5  CATEGORY 6
          DIRECTION    (  .7500MPS)( 2.5000MPS)( 4.3000MPS)( 6.8000MPS)( 9.5000MPS)(12.5000MPS)
         (DEGREES)
                 000     .00073530   .00077080   .00057100   .00000000   .00000000   .00000000
              22 500     .00104880   .00108480   .00048530   .00000000   .00000000   .00000000
              45 000     .00044440   .00068510   .00019980   .00000000   .00000000   .00000000
              67 500     .00096290   .00148450   .00085640   .00000000   .00000000   .00000000
              90 000     .00187750   .00279770   .00168430   .00000000   .00000000   .00000000
             112 500     .00168920   .00279770   .00276910   .00000000   .00000000   .00000000
             135 000     .00197700   .00316880   .00342570   .00000000   .00000000   .00000000
             157 500     .00262380   .00399670   .00425361   .00000000   .00000000   .00000000
             180 000     .00459181   .00422511   .00285480   .00000000   .00000000   .00000000
             202 500     .00262740   .00308320   .00105630   .00000000   .00000000   .00000000
             225 000     .00145670   .00108480   .00062810   .00000000   .00000000   .00000000
             247 500     .00165270   .00211250   .00071370   .00000000   .00000000   .00000000
             270 000     .00249990   .00211250   .00111340   .00000000   .00000000   .00000000
             292 500     .00134250   .00119900   .00077080   .00000000   .00000000   .00000000
             315 000     .00091510   .00068510   .00045680   .00000000   .00000000   .00000000
             337 500     .00073250   .00074220   .00037110   .00000000   .00000000   .00000000
```

FIGURE D-4. (Continued)

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**** ISCLT *************              HYPOTHETICAL POTASH PROCESSING PLANT                              ******** PAGE      3 ****

                                                - ISCLT INPUT DATA (CONT.) -

                                 - FREQUENCY OF OCCURRENCE OF WIND SPEED, DIRECTION AND STABILITY -
                                                          SEASON 1
                                                    STABILITY CATEGORY 3

                    WIND SPEED  WIND SPEED  WIND SPEED  WIND SPEED  WIND SPEED  WIND SPEED
                    CATEGORY 1  CATEGORY 2  CATEGORY 3  CATEGORY 4  CATEGORY 5  CATEGORY 6
        DIRECTION   (  .7500MPS)( 2.5000MPS)( 4.3000MPS)( 6.8000MPS)( 9.5000MPS)(12.5000MPS)
       (DEGREES)
             .000      .00046450   .00094210   .00125610   .00014270   .00002850   .00000000
           22.500      .00069900   .00079930   .00151300   .00048530   .00014270   .00002850
           45.000      .00026680   .00074220   .00094210   .00042820   .00002850   .00000000
           67.500      .00053170   .00145590   .00157010   .00042820   .00005710   .00000000
           90.000      .00068820   .00279770   .00585231   .00071370   .00008560   .00000000
          112.500      .00069610   .00376830   .00696571   .00211250   .00014270   .00000000
          135.000      .00058420   .00305460   .00756521   .00316080   .00017130   .00000000
          157.500      .00060830   .00425361   .00810761   .00259780   .00019980   .00000000
          180.000      .00117710   .00408231   .00511011   .00062810   .00011420   .00002850
          202.500      .00077160   .00353990   .00245510   .00025690   .00011420   .00008560
          225.000      .00060500   .00162720   .00202690   .00045680   .00008560   .00014270
          247.500      .00082450   .00385390   .00288330   .00031390   .00017130   .00034260
          270.000      .00141350   .00439641   .00596651   .00111340   .00028550   .00034260
          292.500      .00085360   .00211250   .00339720   .00051390   .00025690   .00022840
          315.000      .00035030   .00105630   .00134170   .00017130   .00005710   .00002850
          337.500      .00065610   .00105630   .00094210   .00011420   .00005710   .00000000
                                                          SEASON 1
                                                    STABILITY CATEGORY 4

                    WIND SPEED  WIND SPEED  WIND SPEED  WIND SPEED  WIND SPEED  WIND SPEED
                    CATEGORY 1  CATEGORY 2  CATEGORY 3  CATEGORY 4  CATEGORY 5  CATEGORY 6
        DIRECTION   (  .7500MPS)( 2.5000MPS)( 4.3000MPS)( 6.8000MPS)( 9.5000MPS)(12.5000MPS)
       (DEGREES)
             .000      .00095500   .00259780   .00790771   .01367442   .01127641   .01027721
           22.500      .00060970   .00274060   .00887841   .01347452   .00807901   .00505301
           45.000      .00039840   .00168430   .00659451   .00553031   .00205540   .00054240
           67.500      .00084880   .00408231   .00862141   .00616631   .00114190   .00019980
           90.000      .00198280   .00619491   .01490192   .01247542   .00194120   .00022840
          112.500      .00133850   .00533841   .01661482   .01841332   .00322590   .00048530
          135.000      .00071740   .00353990   .00907821   .01190441   .00171290   .00019980
          157.500      .00098470   .00342570   .00659451   .00702281   .00119900   .00025690
          180.000      .00100970   .00376830   .00468181   .00451051   .00125610   .00062810
          202.500      .00057970   .00291190   .00214110   .00342570   .00131320   .00048530
          225.000      .00049800   .00137030   .00225530   .00345430   .00199830   .00125610
          247.500      .00055980   .00179850   .00565301   .00588081   .00285480   .00208400
          270.000      .00122310   .00459621   .00913531   .01484482   .00790771   .00576671
          292.500      .00069900   .00202690   .00742241   .01415972   .01061981   .00659451
          315.000      .00053550   .00188420   .00511011   .00759371   .00294040   .00194120
          337.500      .00074000   .00216960   .00653741   .00559541   .00262640   .00159870
```

FIGURE D-4. (Continued)

```
                                   - ISCLT INPUT DATA (CONT.) -

                 - FREQUENCY OF OCCURRENCE OF WIND SPEED, DIRECTION AND STABILITY -
                                            SEASON 1
                                      STABILITY CATEGORY 5

                 WIND SPEED  WIND SPEED  WIND SPEED  WIND SPEED  WIND SPEED  WIND SPEED
                 CATEGORY 1  CATEGORY 2  CATEGORY 3  CATEGORY 4  CATEGORY 5  CATEGORY 6
 DIRECTION     (   .7500MPS)( 2.5000MPS)( 4.3000MPS)( 6.8000MPS)( 9.5000MPS)(12.5000MPS)
(DEGREES)
       .000       .00000000   .00525281   .00950641   .00000000   .00000000   .00000000
     22.500       .00000000   .00325440   .00767941   .00000000   .00000000   .00000000
     45.000       .00000000   .00177000   .00570961   .00000000   .00000000   .00000000
     67.500       .00000000   .00336860   .00759371   .00000000   .00000000   .00000000
     90.000       .00000000   .00496731   .00970621   .00000000   .00000000   .00000000
    112.500       .00000000   .00274060   .00562391   .00000000   .00000000   .00000000
    135.000       .00000000   .00177000   .00274060   .00000000   .00000000   .00000000
    157.500       .00000000   .00236950   .00182710   .00000000   .00000000   .00000000
    180.000       .00000000   .00245510   .00157010   .00000000   .00000000   .00000000
    202.500       .00000000   .00182710   .00131320   .00000000   .00000000   .00000000
    225.000       .00000000   .00165580   .00199830   .00000000   .00000000   .00000000
    247.500       .00000000   .00342570   .00553831   .00000000   .00000000   .00000000
    270.000       .00000000   .00668021   .01116221   .00000000   .00000000   .00000000
    292.500       .00000000   .00499591   .00702281   .00000000   .00000000   .00000000
    315.000       .00000000   .00356850   .00630911   .00000000   .00000000   .00000000
    337.500       .00000000   .00522421   .00899231   .00000000   .00000000   .00000000
                                            SEASON 1
                                      STABILITY CATEGORY 6

                 WIND SPEED  WIND SPEED  WIND SPEED  WIND SPEED  WIND SPEED  WIND SPEED
                 CATEGORY 1  CATEGORY 2  CATEGORY 3  CATEGORY 4  CATEGORY 5  CATEGORY 6
 DIRECTION     (   .7500MPS)( 2.5000MPS)( 4.3000MPS)( 6.8000MPS)( 9.5000MPS)(12.5000MPS)
(DEGREES)
       .000       .00684121   .00973481   .00000000   .00000000   .00000000   .00000000
     22.500       .00373070   .00559541   .00000000   .00000000   .00000000   .00000000
     45.000       .00247790   .00431071   .00000000   .00000000   .00000000   .00000000
     67.500       .00283840   .00493881   .00000000   .00000000   .00000000   .00000000
     90.000       .00475321   .00773641   .00000000   .00000000   .00000000   .00000000
    112.500       .00306470   .00491021   .00000000   .00000000   .00000000   .00000000
    135.000       .00320440   .00282620   .00000000   .00000000   .00000000   .00000000
    157.500       .00356230   .00236950   .00000000   .00000000   .00000000   .00000000
    180.000       .00470731   .00316880   .00000000   .00000000   .00000000   .00000000
    202.500       .00486151   .00416801   .00000000   .00000000   .00000000   .00000000
    225.000       .00296740   .00342570   .00000000   .00000000   .00000000   .00000000
    247.500       .00590741   .00944931   .00000000   .00000000   .00000000   .00000000
    270.000       .01170781   .02035443   .00000000   .00000000   .00000000   .00000000
    292.500       .00742881   .01204721   .00000000   .00000000   .00000000   .00000000
    315.000       .00629421   .00982041   .00000000   .00000000   .00000000   .00000000
    337.500       .00761371   .01281802   .00000000   .00000000   .00000000   .00000000
```

FIGURE D-4.   (Continued)

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**** ISCLT *************                HYPOTHETICAL POTASH PROCESSING PLANT                              ******** PAGE      5 ****

                                           - ISCLT INPUT DATA (CONT.) -

                              - VERTICAL POTENTIAL TEMPERATURE GRADIENT (DEGREES KELVIN/METER) -

                       WIND SPEED   WIND SPEED   WIND SPEED   WIND SPEED   WIND SPEED   WIND SPEED
                       CATEGORY 1   CATEGORY 2   CATEGORY 3   CATEGORY 4   CATEGORY 5   CATEGORY 6
STABILITY CATEGORY 1   .000000      .000000      .000000      .000000      .000000      .000000
STABILITY CATEGORY 2   .000000      .000000      .000000      .000000      .000000      .000000
STABILITY CATEGORY 3   .000000      .000000      .000000      .000000      .000000      .000000
STABILITY CATEGORY 4   .000000      .000000      .000000      .000000      .000000      .000000
STABILITY CATEGORY 5   .200000-01   .200000-01   .200000-01   .200000-01   .200000-01   .200000-01
STABILITY CATEGORY 6   .350000-01   .350000-01   .350000-01   .350000-01   .350000-01   .350000-01
                                        - WIND PROFILE POWER LAW EXPONENTS -

                       WIND SPEED   WIND SPEED   WIND SPEED   WIND SPEED   WIND SPEED   WIND SPEED
                       CATEGORY 1   CATEGORY 2   CATEGORY 3   CATEGORY 4   CATEGORY 5   CATEGORY 6
STABILITY CATEGORY 1   .100000+00   .100000+00   .100000+00   .100000+00   .100000+00   .100000+00
STABILITY CATEGORY 2   .150000+00   .150000+00   .150000+00   .150000+00   .150000+00   .150000+00
STABILITY CATEGORY 3   .200000+00   .200000+00   .200000+00   .200000+00   .200000+00   .200000+00
STABILITY CATEGORY 4   .250000+00   .250000+00   .250000+00   .250000+00   .250000+00   .250000+00
STABILITY CATEGORY 5   .300000+00   .300000+00   .300000+00   .300000+00   .300000+00   .300000+00
STABILITY CATEGORY 6   .300000+00   .300000+00   .300000+00   .300000+00   .300000+00   .300000+00
```

FIGURE D-4. (Continued)

```
**** ISCLT *************             HYPOTHETICAL POTASH PROCESSING PLANT                        ******** PAGE     6 ****

                                                - SOURCE INPUT DATA -

C T SOURCE SOURCE     X            Y       EMISSION  BASE /
A A NUMBER  TYPE  COORDINATE  COORDINATE  HEIGHT  ELEV- /                    - SOURCE DETAILS DEPENDING ON TYPE -
R P                  (M)          (M)       (M)   ATION /
D E                                                  (M)  /
----------------------------------------------------------------------------------------------------------------------
X       1  AREA        -13.30       -13.30  10.00      .00 WIDTH OF AREA (M)=   26.60
                                                                              - PARTICULATE CATEGORIES -
                                                                               1      2      3      4      5      6
                                                        FALL VELOCITY (MPS)     .0010  .0070  .0190  .0370  .0610  .0990
                                                        MASS FRACTION           .1000  .4000  .2800  .1200  .0600  .0400
                                                        REFLECTION COEFFICIENT 1.0000  .8200  .7200  .6500  .5900  .5000
                                                              - SOURCE STRENGTHS ( GRAMS  PER SQUARE METER                ) -
                                                                                          - SEASON 1 -
                                           SPEED CATEGORY                            - STABILITY CATEGORIES -
                                                          (1)         (2)         (3)         (4)         (5)         (6)
                                                 1     1.26000+07  9.46000+06  6.31000+06  3.15000+07  0.00000     1.58000+06
                                                 2     1.58000+07  1.26000+07  9.46000+06  7.88000+06  6.31000+06  3.15000+06
                                                 3     0.00000     1.58000+07  1.26020+07  1.26000+07  9.46000+06  0.00000
                                                 4     0.00000     0.00000     1.58000+07  1.58000+07  0.00000     0.00000
                                                 5     0.00000     0.00000     2.21000+07  2.21000+07  0.00000     0.00000
                                                 6     0.00000     0.00000     3.15000+07  3.15000+07  0.00000     0.00000
WARNING - DISTANCE BETWEEN SOURCE      1 AND POINT X,Y=        .00,        .00 IS LESS THAN PERMITTED
X       2 VOLUME       20.00          .00     .90      .00 STANDARD DEVIATION OF THE CROSSWIND SOURCE DISTRIBUTION (M)=   4.70
                                                        STANDARD DEVIATION OF THE VERTICAL SOURCE DISTRIBUTION (M)=   1.00
                                                                              - PARTICULATE CATEGORIES -
                                                                               1      2      3      4      5      6
                                                        FALL VELOCITY (MPS)     .0010  .0070  .0190  .0370  .0610  .0990
                                                        MASS FRACTION           .1000  .4000  .2800  .1200  .0600  .0400
                                                        REFLECTION COEFFICIENT 1.0000  .8200  .7200  .6500  .5900  .5000
                                                              - SOURCE STRENGTHS ( GRAMS                                  ) -
                                                                                          - SEASON 1 -
                                           SPEED CATEGORY                            - STABILITY CATEGORIES -
                                                          (1)         (2)         (3)         (4)         (5)         (6)
                                                 1     4.10000+06  3.15000+06  2.52000+06  1.26000+06  0.00000     6.31000+05
                                                 2     5.05000+06  4.10000+06  3.78000+06  3.15000+06  2.52000+06  1.58000+06
                                                 3     0.00000     5.05000+06  4.42000+06  4.10000+06  3.15000+06  0.00000
                                                 4     0.00000     0.00000     5.05000+06  5.05000+06  0.00000     0.00000
                                                 5     0.00000     0.00000     5.99000+06  5.99000+06  0.00000     0.00000
                                                 6     0.00000     0.00000     6.94000+06  6.94000+06  0.00000     0.00000
WARNING - DISTANCE BETWEEN SOURCE      2 AND POINT X,Y=        .00,        .00 IS LESS THAN PERMITTED
```

FIGURE D-4. (Continued)

```
**** ISCLT *************                    HYPOTHETICAL POTASH PROCESSING PLANT                                   ******** PAGE      7 ****

                                                        - SOURCE INPUT DATA -

C T SOURCE SOURCE      X            Y        EMISSION  BASE /
A A NUMBER  TYPE  COORDINATE  COORDINATE   HEIGHT  ELEV- /                     - SOURCE DETAILS DEPENDING ON TYPE -
R P                  (M)          (M)         (M)   ATION /
D E                                                   (M)  /
------------------------------------------------------------------------------------------------------------------------------
X        3 VOLUME       30.00           .00   2.60       .00 STANDARD DEVIATION OF THE CROSSWIND SOURCE DISTRIBUTION (M)=   4.70
                                                             STANDARD DEVIATION OF THE VERTICAL SOURCE DISTRIBUTION (M)=   1.00
                                                                                   - PARTICULATE CATEGORIES -
                                                                               1       2       3       4       5       6
                                                             FALL VELOCITY (MPS)     .0010   .0070   .0190   .0370   .0610   .0990
                                                             MASS FRACTION           .1000   .4000   .2800   .1200   .0600   .0400
                                                             REFLECTION COEFFICIENT 1.0000   .8200   .7200   .6500   .5900   .5000
                                                                   - SOURCE S:RENGTHS ( GRAMS                                      ) -
                                                                                            - SEASON 1 -
                                              SPEED CATEGORY                          - STABILITY CATEGORIES -
                                                             (1)          (2)          (3)          (4)          (5)          (6)
                                                     1    4.10000+06   3.15000+06   2.52000+06   1.26000+06   0.00000      6.31000+05
                                                     2    5.05000+06   4.10000+06   3.78000+06   3.15000+06   2.52000+06   1.58000+06
                                                     3    0.00000      5.05000+06   4.42000+06   4.10000+06   3.15000+06   0.00000
                                                     4    0.00000      0.00000      5.05000+06   5.05000+06   0.00000      0.00000
                                                     5    0.00000      0.00000      5.99000+06   5.99000+06   0.00000      0.00000
                                                     6    0.00000      0.00000      6.94000+06   6.94000+06   0.00000      0.00000
WARNING - DISTANCE BETWEEN SOURCE      3 AND POINT X,Y=          .00,          .00 IS LESS THAN PERMITTED
X        4 VOLUME       40.00           .00   4.30       .00 STANDARD DEVIATION OF THE CROSSWIND SOURCE DISTRIBUTION (M)=   4.70
                                                             STANDARD DEVIATION OF THE VERTICAL SOURCE DISTRIBUTION (M)=   1.00
                                                                                   - PARTICULATE CATEGORIES -
                                                                               1       2       3       4       5       6
                                                             FALL VELOCITY (MPS)     .0010   .0070   .0190   .0370   .0610   .0990
                                                             MASS FRACTION           .1000   .4000   .2800   .1200   .0600   .0400
                                                             REFLECTION COEFFICIENT 1.0000   .8200   .7200   .6500   .5900   .5000
                                                                   - SOURCE STRENGTHS ( GRAMS                                      ) -
                                                                                            - SEASON 1 -
                                              SPEED CATEGORY                          - STABILITY CATEGORIES -
                                                             (1)          (2)          (3)          (4)          (5)          (6)
                                                     1    4.10000+06   3.15000+06   2.52000+06   1.26000+06   0.00000      6.31000+05
                                                     2    5.05000+06   4.10000+06   3.78000+06   3.15000+06   2.52000+06   1.58000+06
                                                     3    0.00000      5.05000+06   4.42000+06   4.10000+06   3.15000+06   0.00000
                                                     4    0.00000      0.00000      5.05000+06   5.05000+06   0.00000      0.00000
                                                     5    0.00000      0.00000      5.99000+06   5.99000+06   0.00000      0.00000
                                                     6    0.00000      0.00000      6.94000+06   6.94000+06   0.00000      0.00000
WARNING - DISTANCE BETWEEN SOURCE      4 AND POINT X,Y=          .00,          .00 IS LESS THAN PERMITTED
```

FIGURE D-4. (Continued)

```
**** ISCLT *************                 HYPOTHETICAL POTASH PROCESSING PLANT                              ******** PAGE      8 ****

                                                         - SOURCE INPUT DATA -

C T SOURCE SOURCE      X            Y       EMISSION  BASE /
A A NUMBER  TYPE  COORDINATE  COORDINATE  HEIGHT  ELEV- /                  - SOURCE DETAILS DEPENDING ON TYPE -
R P                  (M)          (M)        (M)   ATION /
D E                                                 (M)  /
----------------------------------------------------------------------------------------------------------------------------
X        5 VOLUME        49.00          .00   6.10      .00 STANDARD DEVIATION OF THE CROSSWIND SOURCE DISTRIBUTION (M)=   4.70
                                                            STANDARD DEVIATION OF THE VERTICAL SOURCE DISTRIBUTION (M)=   1.00
                                                                                 - PARTICULATE CATEGORIES -
                                                                                1      2      3      4      5      6
                                                            FALL VELOCITY (MPS)      .0010  .0070  .0190  .0370  .0610  .0990
                                                            MASS FRACTION            .1000  .4000  .2800  .1200  .0600  .0400
                                                            REFLECTION COEFFICIENT 1.0000  .8200  .7200  .6500  .5900  .5000
                                                                 - SOURCE STRENGTHS ( GRAMS                                   ) -
                                                                                        - SEASON 1 -
                                           SPEED CATEGORY                          - STABILITY CATEGORIES -
                                                              (1)           (2)           (3)           (4)           (5)           (6)
                                                   1     4.10000+06    3.15000+06    2.52000+06    1.26000+06    0.00000       6.31000+05
                                                   2     5.05000+06    4.10000+06    3.78000+06    3.15000+06    2.52000+06    1.58000+06
                                                   3     0.00000       5.05000+06    4.42000+06    4.10000+06    3.15000+06    0.00000
                                                   4     0.00000       0.00000       5.05000+06    5.05000+06    0.00000       0.00000
                                                   5     0.00000       0.00000       5.99000+06    5.99000+06    0.00000       0.00000
                                                   6     0.00000       0.00000       6.94000+06    6.94000+06    0.00000       0.00000
WARNING - DISTANCE BETWEEN SOURCE      5 AND POINT X,Y=         .00,          .00 IS LESS THAN PERMITTED
X        6 VOLUME        59.00          .00   7.80      .00 STANDARD DEVIATION OF THE CROSSWIND SOURCE DISTRIBUTION (M)=   4.70
                                                            STANDARD DEVIATION OF THE VERTICAL SOURCE DISTRIBUTION (M)=   1.00
                                                                                 - PARTICULATE CATEGORIES -
                                                                                1      2      3      4      5      6
                                                            FALL VELOCITY (MPS)      .0010  .0070  .0190  .0370  .0610  .0990
                                                            MASS FRACTION            .1000  .4000  .2800  .1200  .0600  .0400
                                                            REFLECTION COEFFICIENT 1.0000  .8200  .7200  .6500  .5900  .5000
                                                                 - SOURCE STRENGTHS ( GRAMS                                   ) -
                                                                                        - SEASON 1 -
                                           SPEED CATEGORY                          - STABILITY CATEGORIES -
                                                              (1)           (2)           (3)           (4)           (5)           (6)
                                                   1     4.10000+06    3.15000+06    2.52000+06    1.26000+06    0.00000       6.31000+05
                                                   2     5.05000+06    4.10000+06    3.78000+06    3.15000+06    2.52000+06    1.58000+06
                                                   3     0.00000       5.05000+06    4.42000+06    4.10000+06    3.15000+06    0.00000
                                                   4     0.00000       0.00000       5.05000+06    5.05000+06    0.00000       0.00000
                                                   5     0.00000       0.00000       5.99000+06    5.99000+06    0.00000       0.00000
                                                   6     0.00000       0.00000       6.94000+06    6.94000+06    0.00000       0.00000
WARNING - DISTANCE BETWEEN SOURCE      6 AND POINT X,Y=         .00,          .00 IS LESS THAN PERMITTED
```

FIGURE D-4. (Continued)

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**** ISCLT *************                    HYPOTHETICAL POTASH PROCESSING PLANT                              ******** PAGE      9 ****

                                                 - SOURCE INPUT DATA -

C T SOURCE SOURCE      X            Y       EMISSION  BASE /
A A NUMBER  TYPE  COORDINATE  COORDINATE  HEIGHT  ELEV- /                  - SOURCE DETAILS DEPENDING ON TYPE -
R P                  (M)          (M)        (M)   ATION /
D E                                                 (M)  /
----------------------------------------------------------------------------------------------------------------------------
X       7 VOLUME      69.00          .00    9.60      .00 STANDARD DEVIATION OF THE CROSSWIND SOURCE DISTRIBUTION (M)=   4.70
                                                          STANDARD DEVIATION OF THE VERTICAL SOURCE DISTRIBUTION (M)=   1.00
                                                                         - PARTICULATE CATEGORIES -
                                                                         1      2      3      4      5      6
                                                          FALL VELOCITY (MPS)      .0010  .0070  .0190  .0370  .0610  .0990
                                                          MASS FRACTION            .1000  .4000  .2800  .1200  .0600  .0400
                                                          REFLECTION COEFFICIENT 1.0000  .8200  .7200  .6500  .5900  .5000
                                                                - SOURCE STRENGTHS ( GRAMS                                   ) -
                                                                                       - SEASON 1 -
                                      SPEED CATEGORY                              - STABILITY CATEGORIES -
                                                     (1)           (2)           (3)           (4)           (5)           (6)
                                             1    4.10000+06   3.15000+06   2.52000+06   1.26000+06   0.00000      6.31000+05
                                             2    5.05000+06   4.10000+06   3.78000+06   3.15000+06   2.52000+06   1.58000+06
                                             3    0.00000      5.05000+06   4.42000+06   4.10000+06   3.15000+06   0.00000
                                             4    0.00000      0.00000      5.05000+06   5.05000+06   0.00000      0.00000
                                             5    0.00000      0.00000      5.99000+06   5.99000+06   0.00000      0.00000
                                             6    0.00000      0.00000      6.94000+06   6.94000+06   0.00000      0.00000
WARNING - DISTANCE BETWEEN SOURCE      7 AND POINT X,Y=         .00,          .00 IS LESS THAN PERMITTED
X       8 VOLUME      79.00          .00   11.30      .00 STANDARD DEVIATION OF THE CROSSWIND SOURCE DISTRIBUTION (M)=   4.70
                                                          STANDARD DEVIATION OF THE VERTICAL SOURCE DISTRIBUTION (M)=   1.00
                                                                         - PARTICULATE CATEGORIES -
                                                                         1      2      3      4      5      6
                                                          FALL VELOCITY (MPS)      .0010  .0070  .0190  0370  .0610  .0990
                                                          MASS FRACTION            .1000  .4000  .2800  .1200  .0600  .0400
                                                          REFLECTION COEFFICIENT 1.0000  .8200  .7200  6500  .5900  .5000
                                                                - SOURCE STRENGTHS ( GRAMS                                   ) -
                                                                                       - SEASON 1 -
                                      SPEED CATEGORY                              - STABILITY CATEGORIES -
                                                     (1)           (2)           (3)           (4)           (5)           (6)
                                             1    4.10000+06   3.15000+06   2.52000+06   1.26000+06   0.00000      6.31000+05
                                             2    5.05000+06   4.10000+06   3.78000+06   3.15000+06   2.52000+06   1.58000+06
                                             3    0.00000      5.05000+06   4.42000+06   4.10000+06   3.15000+06   0.00000
                                             4    0.00000      0.00000      5.05000+06   5.05000+06   0.00000      0.00000
                                             5    0.00000      0.00000      5.99000+06   5.99000+06   0.00000      0.00000
                                             6    0.00000      0.00000      6.94000+06   6.94000+06   0.00000      0.00000
WARNING - DISTANCE BETWEEN SOURCE      8 AND POINT X,Y=         .00,          .00 IS LESS THAN PERMITTED
```

FIGURE D-4. (Continued)

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**** ISCLT *************                     HYPOTHETICAL POTASH PROCESSING PLANT                                  ******** PAGE    10 ****

                                                         - SOURCE INPUT DATA -

C T SOURCE SOURCE     X          Y       EMISSION  BASE /
A A NUMBER  TYPE  COORDINATE COORDINATE  HEIGHT  ELEV- /                    - SOURCE DETAILS DEPENDING ON TYPE -
R P                  (M)        (M)        (M)   ATION /
D E                                                (M)  /
-------------------------------------------------------------------------------------------------------------------------------
X       9 VOLUME      89.00        .00  13.00      .00 STANDARD DEVIATION OF THE CROSSWIND SOURCE DISTRIBUTION (M)=   4.70
                                                       STANDARD DEVIATION OF THE VERTICAL SOURCE DISTRIBUTION (M)=   1.00
                                                                          - PARTICULATE CATEGORIES -
                                                                           1      2      3      4      5      6
                                                       FALL VELOCITY (MPS)     .0010  .0070  .0190  .0370  .0610  .0990
                                                       MASS FRACTION           .1000  .4000  .2800  .1200  .0600  .0400
                                                       REFLECTION COEFFICIENT 1.0000  .8200  .7200  .6500  .5900  .5000
                                                           - SOURCE STRENGTHS ( GRAMS                                     ) -
                                                                                - SEASON 1 -
                                   SPEED CATEGORY                         - STABILITY CATEGORIES -
                                                   (1)          (2)          (3)          (4)          (5)          (6)
                                          1     4.10000+06   3.15000+06   2.52000+06   1.26000+06   0.00000      6.31000+05
                                          2     5.05000+06   4.10000+06   3.78000+06   3.15000+06   2.52000+06   1.58000+06
                                          3     0.00000      5.05000+06   4.42000+06   4.10000+06   3.15000+06   0.00000
                                          4     0.00000      0.00000      5.05000+06   5.05000+06   0.00000      0.00000
                                          5     0.00000      0.00000      5.99000+06   5.99000+06   0.00000      0.00000
                                          6     0.00000      0.00000      6.94000+06   6.94000+06   0.00000      0.00000
WARNING - DISTANCE BETWEEN SOURCE      9 AND POINT X,Y=        .00,        .00 IS LESS THAN PERMITTED
X      10 VOLUME      99.00        .00  14.80      .00 STANDARD DEVIATION OF THE CROSSWIND SOURCE DISTRIBUTION (M)=   4.70
                                                       STANDARD DEVIATION OF THE VERTICAL SOURCE DISTRIBUTION (M)=   1.00
                                                                          - PARTICULATE CATEGORIES -
                                                                           1      2      3      4      5      6
                                                       FALL VELOCITY (MPS)     .0010  .0070  .0190  .0370  .0610  .0990
                                                       MASS FRACTION           .1000  .4000  .2800  .1200  .0600  .0400
                                                       REFLECTION COEFFICIENT 1.0000  .8200  .7200  .6500  .5900  .5000
                                                           - SOURCE STRENGTHS ( GRAMS                                     ) -
                                                                                - SEASON 1 -
                                   SPEED CATEGORY                         - STABILITY CATEGORIES -
                                                   (1)          (2)          (3)          (4)          (5)          (6)
                                          1     4.10000+06   3.15000+06   2.52000+06   1.26000+06   0.00000      6.31000+05
                                          2     5.05000+06   4.10000+06   3.78000+06   3.15000+06   2.52000+06   1.58000+06
                                          3     0.00000      5.05000+06   4.42000+06   4.10000+06   3.15000+06   0.00000
                                          4     0.00000      0.00000      5.05000+06   5.05000+06   0.00000      0.00000
                                          5     0.C0000      0.00000      5.99000+06   5.99000+06   0.00000      0.00000
                                          6     0.00000      0.00000      6.94000+06   6.94000+06   0.00000      0.00000
WARNING - DISTANCE BETWEEN SOURCE     10 AND POINT X,Y=        .00,        .00 IS LESS THAN PERMITTED
WARNING - DISTANCE BETWEEN SOURCE     10 AND POINT X,Y=     200.00,        .00 IS LESS THAN PERMITTED
```

FIGURE D-4. (Continued)

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**** ISCLT *************                HYPOTHETICAL POTASH PROCESSING PLANT                        ******** PAGE     11 ****

                                              - SOURCE INPUT DATA -

C T SOURCE SOURCE    X          Y     EMISSION  BASE /
A A NUMBER  TYPE  COORDINATE COORDINATE  HEIGHT ELEV- /                - SOURCE DETAILS DEPENDING ON TYPE -
R P                 (M)        (M)       (M)   ATION /
D E                                             (M)  /
------------------------------------------------------------------------------------------------------------------------
X      11 VOLUME      109.00        .00 16.50     .00 STANDARD DEVIATION OF THE CROSSWIND SOURCE DISTRIBUTION (M)=   4.70
                                                      STANDARD DEVIATION OF THE VERTICAL SOURCE DISTRIBUTION (M)=    1.00
                                                                            - PARTICULATE CATEGORIES -
                                                                                1      2      3      4      5      6
                                                      FALL VELOCITY (MPS)     .0010  .0070  .0190  .0370  .0610  .0990
                                                      MASS FRACTION           .1000  .4000  .2800  .1200  .0600  .0400
                                                      REFLECTION COEFFICIENT 1.0000  .8200  .7200  .6500   5900  .5000
                                                           - SOURCE STRENGTHS ( GRAMS                               ) -
                                                                                      - SEASON 1 -
                                    SPEED CATEGORY                            - STABILITY CATEGORIES -
                                                       (1)         (2)         (3)         (4)         (5)         (6)
                                           1        4.10000+06  3.15000+06  2.52000+06  1.26000+06  0.00000     6.31000+05
                                           2        5.05000+06  4.10000+06  3.78000+06  3.15000+06  2.52000+06  1.58000+06
                                           3        0.00000     5.05000+06  4.42000+06  4.10000+06  3.15000+06  0.00000
                                           4        0.00000     0.00000     5.05000+06  5.05000+06  0.00000     0.00000
                                           5        0.00000     0.00000     5.99000+06  5.99000+06  0.00000     0.00000
                                           6        0.00000     0.00000     6.94000+06  6.94000+06  0.00000     0.00000
WARNING - DISTANCE BETWEEN SOURCE   11 AND POINT X,Y=      .00,         .00 IS LESS THAN PERMITTED
WARNING - DISTANCE BETWEEN SOURCE   11 AND POINT X,Y=   200.00,         .00 IS LESS THAN PERMITTED
```

FIGURE D-4. (Continued)

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**** ISCLT *************                  HYPOTHETICAL POTASH PROCESSING PLANT                             ********* PAGE     12 ****

      **   ANNUAL GROUND LEVEL DEPOSITION ( GRAMS PER SQUARE METER                    ) DUE TO SOURCE      1           **
                                                          - GRID SYSTEM RECEPTORS -
                                                        - X AXIS (DISTANCE, METERS) -
                     -3000.000      -2000.000      -1500.000      -1250.000      -1000.000       -800.000       -600.000       -400.000       -200.000
 Y AXIS (DISTANCE          , METERS  )                            -    DEPOSITION     -
               ------------------------------------------------------------------------------------------------------------------------------------

       3000.000       1.177311       1.649670       1.942781       2.113508       2.146537       2.104927       2.210429       2.212444       2.213110
       2000.000       1.941742       2.571310       3.197137       3.571495       3.908890       4.090959       4.168961       4.203479       4.172752
       1500.000       2.507614       3.825994       4.705694       5.196141       5.922025       6.433036       6.791924       6.992942       7.061751
       1250.000       2.874048       4.705649       6.081422       6.952991       7.872629       9.032049      10.054425      10.703855      11.118536
       1000.000       2.999369       5.733793       8.088847       9.681454      11.865846      13.603548      16.315169      18.797211      19.553910
        800.000       3.098513       6.653129      10.088452      12.927925      16.752305      21.014127      25.409379      31.579581      35.135495
        600.000       3.175006       7.052515      12.535736      16.935764      24.044747      32.628089      45.690753      58.643746      71.846844
        400.000       3.205981       7.351068      13.547723      20.459242      34.177021      50.671238      80.248516     134.967737     189.168676
        200.000       3.232573       7.491634      14.190300      22.041343      37.914615      66.541192     131.854218     288.038895     765.637604
           .000       3.266537       7.607176      14.509007      22.757839      40.192128      72.004727     151.584364     413.960255    1840.271606
       -200.000       2.995128       6.560798      11.859411      17.795750      28.929687      47.819579      85.502153     158.595543     535.628605
       -400.000       2.723544       5.665175       9.571313      13.473963      20.196028      28.577456      46.914226      95.886458     253.563221
       -600.000       2.454137       4.730503       7.339901       9.629569      14.094293      19.797315      32.484347      67.283883     138.566010
       -800.000       2.170357       3.831705       5.827090       7.725574      10.452632      14.905921      26.514443      46.407284      74.278432
      -1000.000       1.890979       3.239042       4.860136       6.088771       8.449480      13.274841      21.048143      33.809935      43.809544
      -1250.000       1.576221       2.753618       3.832416       4.899463       7.701974      11.193716      15.761356      21.584245      25.990076
      -1500.000       1.386252       2.317428       3.242614       4.657903       6.843745       9.132951      12.377120      14.826538      17.067340
      -2000.000       1.120585       1.709375       2.972174       3.912128       5.067995       6.209299       7.205714       8.078493       8.822123
      -3000.000        .750870       1.483011       2.068812       2.468688       2.745475       2.968474       3.178738       3.359375       3.524765

                                                          - GRID SYSTEM RECEPTORS -
                                                        - X AXIS (DISTANCE, METERS) -
                          .000        200.000        400.000        600.000        800.000       1000.000       1250.000       1500.000       2000.000
 Y AXIS (DISTANCE          , METERS  )                            -    DEPOSITION     -
               ------------------------------------------------------------------------------------------------------------------------------------

       3000.000       2.209485       2.044613       1.922703       1.802229       1.673252       1.544694       1.401376       1.236737        .984170
       2000.000       4.168499       3.702104       3.364983       3.015514       2.681500       2.392026       2.090023       1.794936       1.341951
       1500.000       6.991328       5.965113       5.121821       4.301331       3.728991       3.293262       2.763971       2.428046       2.093123
       1250.000      11.050865       9.102630       7.399745       5.870071       4.991862       4.164119       3.556837       3.257988       2.645530
       1000.000      19.885311      15.406806      11.856076       9.096661       7.168532       6.056642       5.240338       4.533663       3.313753
        800.000      36.269566      26.167227      18.136390      13.555637      10.746755       9.073583       7.327381       5.857664       4.232478
        600.000      78.343783      49.378666      31.810552      23.478791      17.970465      13.790590      10.015278       8.224349       5.604049
        400.000     223.808716     106.297189      69.523837      44.972535      29.809546      22.972790      16.267778      11.875471       7.063783
        200.000    1096.953644     392.371552     165.853096     104.991689      61.159012      37.522183      23.432873      15.733077       8.510150
           .000        .000000    2323.446625     555.181252     207.762184      99.725886      56.012347      31.489052      20.052955      10.109834
       -200.000    2147.008942     685.955971     308.714260     159.084352      83.430305      48.481180      28.536061      18.553629       9.548764
       -400.000     522.029289     193.666315     126.571017      83.950354      56.261406      39.690590      24.696393      16.675395       8.929880
       -600.000     196.798536     106.682861      59.716197      43.355418      33.626699      25.872122      18.924669      14.458414       8.137435
       -800.000      94.839135      61.301114      35.193259      25.706248      19.975269      16.981000      13.807741      10.993648       7.265385
      -1000.000      53.388054      37.895935      24.742311      17.683794      13.664594      11.334692       9.803329       8.404787       5.966101
      -1250.000      29.912083      23.087446      16.801380      11.747612       9.757218       7.924482       6.493009       5.870654       4.669054
      -1500.000      19.115989      15.462472      12.104713       8.905417       7.177703       6.128132       4.930540       4.198903       3.595641
      -2000.000       9.560449       8.217962       7.031328       5.803994       4.632301       3.952537       3.403614       2.885852       2.123993
      -3000.000       3.703823       3.382072       3.103280       2.822104       2.524887       2.229552       1.896510       1.674710       1.349737
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FIGURE D-'. (Continued)

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**** ISCLT *************                HYPOTHETICAL POTASH PROCESSING PLANT                                        ******** PAGE    13 ****

      **   ANNUAL GROUND LEVEL DEPOSITION ( GRAMS PER SQUARE METER                 ) DUE TO SOURCE      1 (CONT.)  **
                                                   - GRID SYSTEM RECEPTORS -
                                                 - X AXIS (DISTANCE, METERS) -
               3000.000
Y AXIS (DISTANCE        , METERS  )                         -   DEPOSITION    -
         -------------------------------------------------------------------------------------------------------------------

   3000.000       .625744
   2000.000      1.062995
   1500.000      1.409258
   1250.000      1.669082
   1000.000      2.103754
    800.000      2.481948
    600.000      2.870629
    400.000      3.251795
    200.000      3.630697
       .000      4.019942
   -200.000      3.862905
   -400.000      3.707263
   -600.000      3.530421
   -800.000      3.318900
  -1000.000      3.090276
  -1250.000      2.806035
  -1500.000      2.367382
  -2000.000      1.714024
  -3000.000       .888084

      **   ANNUAL GROUND LEVEL DEPOSITION ( GRAMS PER SQUARE METER                 ) DUE TO SOURCE      1 (CONT.)  **
                                                   - DISCRETE RECEPTORS -
    X         Y        DEPOSITION             X         Y       DEPOSITION             X         Y       DEPOSITION
 RANGE     AZIMUTH                         RANGE     AZIMUTH                         RANGE     AZIMUTH
           BEARING                                   BEARING                                   BEARING
(METERS) (DEGREES)                        (METERS) (DEGREES)                        (METERS) (DEGREES)
         -------------------------------------------------------------------------------------------------------------------

  2108.0       14.0      3.091886
              - 10 CONTRIBUTING VALUES TO PROGRAM DETERMINED MAXIMUM 10 OF COMBINED SOURCES       1,

                                   X           Y          DEPOSITION
                              COORDINATE   COORDINATE

                               (METERS)     (METERS )
                              ----------------------------------------
                                 200.00          .00      2323.446625
                                    .00      -200.00      2147.008942
                                -200.00          .00      1840.271606
                                    .00       200.00      1096.953644
                                -200.00       200.00       765.637604
                                 200.00      -200.00       685.955971
                                 400.00          .00       555.181252
                                -200.00      -200.00       535.628685
```

FIGURE D-4.   (Continued)

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**** ISCLT *************              HYPOTHETICAL POTASH PROCESSING PLANT                              ******** PAGE     14 ****

     **   ANNUAL GROUND LEVEL DEPOSITION ( GRAMS PER SQUARE METER                  ) DUE TO SOURCE       1 (CONT. )  **
              - 10 CONTRIBUTING VALUES TO PROGRAM DETERMINED MAXIMUM 10 OF COMBINED SOURCES       1.

                                   X           Y          DEPOSITION
                              COORDINATE   COORDINATE

                               (METERS)     (METERS )
                              ---------------------------------------
                                     .00      -400.00      522.029289
                                 -400.00          .00      413.960255
```

FIGURE D-4. (Continued)

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**** ISCLT ************          HYPOTHETICAL POTASH PROCESSING PLANT                                   ******** PAGE    45 ****

 **   ANNUAL GROUND LEVEL DEPOSITION ( GRAMS PER SQUARE METER                    )          FROM COMBINED SOURCES      2,   -11,
                                                       - GRID SYSTEM RECEPTORS -
                                                     - X AXIS (DISTANCE, METERS) -
                   -3000.000    -2000.000    -1500.000    -1250.000    -1000.000     -800.000     -600.000     -400.000     -200.000
Y AXIS (DISTANCE          , METERS  )                         -     DEPOSITION    -
         ------------------------------------------------------------------------------------------------------------------------

     3000.000       .004799      .006990      .008348      .009014      .009367      .009551      .009685      .009719      .009756
     2000.000       .008103      .010570      .013244      .014892      .016460      .017546      .017860      .018070      .018031
     1500.000       .010380      .015693      .018904      .021018      .024057      .026284      .028003      .028776      .029365
     1250.000       .011687      .019044      .024552      .027370      .031076      .035656      .040091      .043177      .045577
     1000.000       .012204      .022908      .031877      .037909      .044986      .052063      .063179      .073121      .079183
      800.000       .012709      .026021      .038977      .049194      .063651      .077339      .093004      .120556      .138761
      600.000       .013049      .027532      .046491      .062047      .088266      .117332      .158849      .211183      .284385
      400.000       .013209      .028643      .050051      .073306      .116572      .174695      .272063      .429731      .657756
      200.000       .013369      .029193      .052067      .078232      .129100      .214942      .401904      .902029     1.966646
         .000       .013538      .029651      .053034      .080157      .133904      .227153      .441264     1.060199     3.848278
     -200.000       .012328      .025853      .044354      .064612      .101877      .159948      .272918      .523503     1.081186
     -400.000       .011243      .022501      .036426      .050200      .072357      .099506      .157582      .257536      .651991
     -600.000       .010166      .018986      .028399      .036377      .052172      .070929      .099555      .192893      .402387
     -800.000       .009031      .015559      .022814      .029656      .039630      .050001      .081403      .145368      .244002
    -1000.000       .007912      .013155      .019258      .023809      .029675      .043951      .069638      .105725      .149987
    -1250.000       .006599      .011256      .015404      .018063      .026756      .038515      .054207      .075731      .092291
    -1500.000       .005829      .009538      .012375      .016873      .024395      .032334      .042270      .053064      .061675
    -2000.000       .004716      .006783      .011191      .014553      .018704      .022697      .026630      .029875      .032696
    -3000.000       .003018      .005797      .007996      .009298      .010571      .011394      .012173      .012826      .013457

                                                       - GRID SYSTEM RECEPTORS -
                                                     - X AXIS (DISTANCE, METERS) -
                        .000      200.000      400.000      600.000      800.000     1000.000     1250.000     1500.000     2000.000
Y AXIS (DISTANCE          , METERS  )                         -     DEPOSITION    -
         ------------------------------------------------------------------------------------------------------------------------

     3000.000       .009662      .009249      .008728      .008174      .007630      .007090      .006410      .005709      .004462
     2000.000       .017755      .016594      .015183      .013766      .012338      .010965      .009497      .008078      .005682
     1500.000       .028708      .026167      .023003      .019526      .016705      .014692      .012233      .010089      .009057
     1250.000       .044910      .040150      .033779      .026938      .022244      .018444      .014564      .013755      .011632
     1000.000       .079578      .069661      .054405      .041130      .032275      .024771      .022204      .019737      .014813
      800.000       .144978      .120988      .087119      .062386      .044236      .038645      .032308      .026172      .018658
      600.000       .307816      .240218      .150566      .097595      .078460      .062275      .045833      .035894      .024931
      400.000       .851850      .582227      .293641      .205685      .141545      .101368      .074189      .053989      .031618
      200.000      4.069319     1.765424      .841389      .518535      .298628      .184018      .110339      .072873      .038417
         .000       .000000    11.241953     3.224391     1.119008      .510062      .275324      .149801      .093316      .045834
     -200.000      5.267834     2.628258     1.468519      .814824      .407879      .234109      .132817      .084890      .042795
     -400.000      1.523628     1.104223      .528881      .370931      .254712      .176805      .111294      .074528      .039356
     -600.000       .625691      .514511      .281069      .184597      .144236      .112796      .082316      .062316      .035367
     -800.000       .315854      .275792      .175240      .120604      .085441      .072023      .059138      .047003      .031151
    -1000.000       .183135      .165179      .117037      .081260      .063541      .048459      .041434      .035661      .025291
    -1250.000       .105423      .097456      .076363      .055629      .044567      .036379      .027770      .024752      .019764
    -1500.000       .068359      .064099      .053038      .041350      .032511      .027895      .022486      .018042      .015222
    -2000.000       .034972      .033443      .029584      .025567      .021419      .017979      .015499      .013132      .009185
    -3000.000       .013963      .013625      .012767      .011821      .010908      .009905      .008665      .007641.     .006115
```

FIGURE D-4. (Continued)

```
**** ISCLT *************                 HYPOTHETICAL POTASH PROCESSING PLANT                     ******** PAGE    46 ****

  **    ANNUAL GROUND LEVEL DEPOSITION ( GRAMS PER SQUARE METER                ) (CONT.) FROM COMBINED SOURCES      2,   -11,
                                                    - GRID SYSTEM RECEPTORS -
                                                  - X AXIS (DISTANCE, METERS) -
                 3000.000
Y AXIS (DISTANCE        , METERS  )                              -    DEPOSITION    -
         -------------------------------------------------------------------------------------------------------------------

    3000.000        .002580
    2000.000        .004656
    1500.000        .006280
    1250.000        .007271
    1000.000        .009295
     800.000        .010974
     600.000        .012651
     400.000        .014401
     200.000        .016093
         .000       .017952
    -200.000        .017133
    -400.000        .016295
    -600.000        .015307
    -800.000        .014340
   -1000.000        .013195
   -1250.000        .011599
   -1500.000        .009983
   -2000.000        .007242
   -3000.000        .003753
  **    ANNUAL GROUND LEVEL DEPOSITION ( GRAMS PER SQUARE METER                ) (CONT.) FROM COMBINED SOURCES      2,   -11,
                                                    - DISCRETE RECEPTORS -
    X          Y         DEPOSITION              X          Y         DEPOSITION              X          Y         DEPOSITION
 RANGE     AZIMUTH                             RANGE     AZIMUTH                            RANGE     AZIMUTH
           BEARING                                       BEARING                                      BEARING
(METERS) (DEGREES)                           (METERS) (DEGREES)                           (METERS) (DEGREES)
         -------------------------------------------------------------------------------------------------------------------

  2108.0       14.0        .014063
                                           - PROGRAM DETERMINED MAXIMUM 10 VALUES -

                                              X            Y            DEPOSITION
                                          COORDINATE   COORDINATE

                                           (METERS)     (METERS )
                                          ----------------------------------------
                                               200.00          .00        11.241953
                                                  .00      -200.00         5.267834
                                                  .00       200.00         4.069319
                                              -200.00          .00         3.848278
                                               400.00          .00         3.224391
                                               200.00      -200.00         2.628258
                                              -200.00       200.00         1.966646
                                               200.00       200.00         1.765424
```

FIGURE D-4. (Continued)

```
**** ISCLT *************                HYPOTHETICAL POTASH PROCESSING PLANT                        ******** PAGE     47 ****

 **   ANNUAL GROUND LEVEL DEPOSITION ( GRAMS PER SQUARE METER                ) (CONT. ) FROM COMBINED SOURCES      2,    -11,
                                          - PROGRAM DETERMINED MAXIMUM 10 VALUES -

                                              X            Y          DEPOSITION
                                          COORDINATE   COORDINATE

                                           (METERS)     (METERS )
                                          ----------------------------------------
                                                 .00      -400.00        1.523628
                                              400.00      -200.00        1.460519
```

FIGURE D-4. (Continued)

```
**** ISCLT **************           HYPOTHETICAL POTASH PROCESSING PLANT                    ********* PAGE     59 ****

  **   ANNUAL GROUND LEVEL DEPOSITION ( GRAMS PER SQUARE METER                )        FROM COMBINED SOURCES    -11,
                                                   - GRID SYSTEM RECEPTORS -
                                                 - X AXIS (DISTANCE, METERS) -
              -3000.000    -2000.000    -1500.000    -1250.000    -1000.000     -800.000     -600.000     -400.000     -200.000
Y AXIS (DISTANCE        , METERS  )                          -    DEPOSITION    -
        ------------------------------------------------------------------------------------------------------------------

   3000.000     1.182111     1.656660     1.951129     2.122522     2.155904     2.194470     2.220114     2.222163     2.222865
   2000.000     1.949846     2.581079     3.210381     3.586387     3.925349     4.108505     4.186821     4.221549     4.190783
   1500.000     2.517993     3.841687     4.724598     5.217158     5.946081     6.459320     6.819926     7.021718     7.091116
   1250.000     2.885734     4.724693     6.105974     6.980361     7.903705     9.067704    10.094515    10.747032    11.164113
   1000.000     3.011652     5.756701     8.120724     9.719363    11.910831    13.655610    16.378347    18.870331    19.633093
    800.000     3.111222     6.679149    10.127428    12.977119    16.815955    21.091464    25.503182    31.700135    35.274254
    600.000     3.188055     7.080047    12.582226    16.998610    24.133012    32.745419    45.849599    58.854927    72.131224
    400.000     3.219190     7.379710    13.597773    20.532627    34.293590    50.845930    80.520576   135.397457   189.826420
    200.000     3.245941     7.520827    14.242366    22.119575    38.043714    66.756130   132.256113   288.940907   767.604210
        000     3.280075     7.636826    14.562041    22.837995    40.326029    72.231876   152.025620   415.020435  1844.119827
   -200.000     3.007456     6.586651    11.903765    17.860362    29.031562    47.979524    85.775066   159.119036   536.709831
   -400.000     2.734786     5.687677     9.607738    13.524162    20.268384    28.676962    47.071805    96.143990   254.215202
   -600.000     2.464303     4.749489     7.368300     9.665945    14.146465    19.868243    32.583899    67.476772   138.968388
   -800.000     2.179388     3.847264     5.849904     7.755229    10.492262    14.955922    26.595845    46.552649    74.522429
  -1000.000     1.898891     3.252196     4.879394     6.112579     8.479154    13.318792    21.117779    33.915658    43.959528
  -1250.000     1.582820     2.764873     3.847820     4.917526     7.728730    11.232230    15.815563    21.659975    26.082366
  -1500.000     1.392081     2.326966     3.254989     4.674776     6.868140     9.165283    12.419389    14.879602    17.129014
  -2000.000     1.125300     1.716158     2.983364     3.926681     5.086699     6.311996     7.232344     8.108367     8.854819
  -3000.000      .753888     1.488808     2.076809     2.477986     2.756046     2.979868     3.190911     3.372200     3.538222

                                                   - GRID SYSTEM RECEPTORS -
                                                 - X AXIS (DISTANCE, METERS) -
                   .000      200.000      400.000      600.000      800.000     1000.000     1250.000     1500.000     2000.000
Y AXIS (DISTANCE        , METERS  )                          -    DEPOSITION    -
        ------------------------------------------------------------------------------------------------------------------

   3000.000     2.219147     2.053861     1.931431     1.810403     1.680902     1.551784     1.407785     1.242446      .988632
   2000.000     4.186253     3.718698     3.380167     3.029280     2.693837     2.402991     2.099520     1.803014     1.347634
   1500.000     7.020035     5.991279     5.144923     4.320857     3.745696     3.307955     2.776204     2.438135     2.102179
   1250.000    11.095774     9.142780     7.433524     5.897008     5.014106     4.182563     3.571401     3.271743     2.657162
   1000.000    19.964809    15.476466    11.910400     9.137790     7.200807     6.081413     5.262541     4.553400     3.320566
    800.000    36.414542    26.288214    18.223508    13.618022    10.790991     9.112228     7.359689     5.883836     4.251136
    600.000    78.651593    49.618803    31.961116    23.576385    18.048523    13.852865    10.061111     8.260243     5.628980
    400.000   224.660555   106.879412    69.817473    45.178218    29.951091    23.074157    16.341966    11.929459     7.095400
    200.000  1101.022903   394.136959   166.694477   105.510219    61.457637    37.706198    23.543211    15.805950     8.540567
        000      .000000  2334.688446   558.405602   208.881186   100.235945    56.287668    31.630852    20.146270    10.155667
   -200.000  2152.276611   688.584190   310.182758   159.899166    83.830179    48.715295    28.668076    18.638518     9.591559
   -400.000   523.552879   194.770531   127.099894    84.321281    56.516116    39.867393    24.807686    16.749922     8.969235
   -600.000   197.424217   107.197368    59.997264    43.540012    33.770932    25.984917    19.006984    14.520728     8.172802
   -800.000    95.154986    61.576904    35.368497    25.826851    20.060709    17.053022    13.866879    11.040650     7.296536
  -1000.000    53.571187    38.061112    24.859347    17.765054    13.728135    11.383150     9.844763     8.440447     5.991391
  -1250.000    30.017505    23.184900    16.877742    11.803240     9.801705     7.960861     6.520779     5.895406     4.688017
  -1500.000    19.184346    15.526571    12.157750     8.946766     7.210294     6.156027     4.953025     4.216945     3.610863
  -2000.000     9.595421     8.251405     7.060911     5.829562     4.653719     3.970516     3.419113     2.898983     2.133178
  -3000.000     3.717786     3.395696     3.116046     2.833925     2.535794     2.239457     1.905175     1.682351     1.355852
```

FIGURE D-4. (Continued)

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**** ISCLT *************                HYPOTHETICAL POTASH PROCESSING PLANT                         ******** PAGE    60 ****

 **   ANNUAL GROUND LEVEL DEPOSITION ( GRAMS PER SQUARE METER                    ) (CONT.) FROM COMBINED SOURCES    -11.
                                                       - GRID SYSTEM RECEPTORS -
                                                     - X AXIS (DISTANCE, METERS) -
                  3000.000
Y AXIS (DISTANCE       , METERS   )                              -   DEPOSITION    -
         ---------------------------------------------------------------------------------------------------------------

    3000.000          .628324
    2000.000         1.067651
    1500.000         1.415546
    1250.000         1.676352
    1000.000         2.113049
     800.000         2.492922
     600.000         2.883279
     400.000         3.266195
     200.000         3.646790
        .000         4.037893
    -200.000         3.880038
    -400.000         3.723558
    -600.000         3.545728
    -800.000         3.333240
   -1000.000         3.103471
   -1250.000         2.817634
   -1500.000         2.377365
   -2000.000         1.721267
   -3000.000          .891837
 **   ANNUAL GROUND LEVEL DEPOSITION ( GRAMS PER SQUARE METER                    ) (CONT.) FROM COMBINED SOURCES    -11.
                                                       - DISCRETE RECEPTORS -
   X          Y          DEPOSITION            X          Y          DEPOSITION            X          Y          DEPOSITION
 RANGE     AZIMUTH                           RANGE     AZIMUTH                           RANGE     AZIMUTH
           BEARING                                     BEARING                                     BEARING
(METERS) (DEGREES)                          (METERS) (DEGREES)                          (METERS) (DEGREES)
         ---------------------------------------------------------------------------------------------------------------

  2108.0       14.0       3.105949
                                              - PROGRAM DETERMINED MAXIMUM 10 VALUES -

                                                   X           Y            DEPOSITION
                                               COORDINATE  COORDINATE

                                               (METERS)    (METERS )
                                              ------------------------------------------
                                                 200.00         .00      2334.688446
                                                    .00     -200.00      2152.276611
                                                -200.00         .00      1844.119827
                                                    .00      200.00      1101.022903
                                                -200.00      200.00       767.604210
                                                 200.00     -200.00       686.584190
                                                 400.00         .00       550.405602
                                                -200.00     -200.00       536.709831
```

FIGURE D-4. (Continued)

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**** ISCLT *************                 HYPOTHETICAL POTASH PROCESSING PLANT                                     ********* PAGE     61 ****

 **   ANNUAL GROUND LEVEL DEPOSITION ( GRAMS PER SQUARE METER                ) (CONT ) FROM COMBINED SOURCES    -11.
                                        - PROGRAM DETERMINED MAXIMUM 10 VALUES -

                                           X            Y          DEPOSITION
                                       COORDINATE   COORDINATE

                                        (METERS)     (METERS )
                                       -------------------------------------
                                              .00      -400.00      523.552879
                                          -400.00         .00      415.020435
```

FIGURE D-4. (Continued)

APPENDIX E

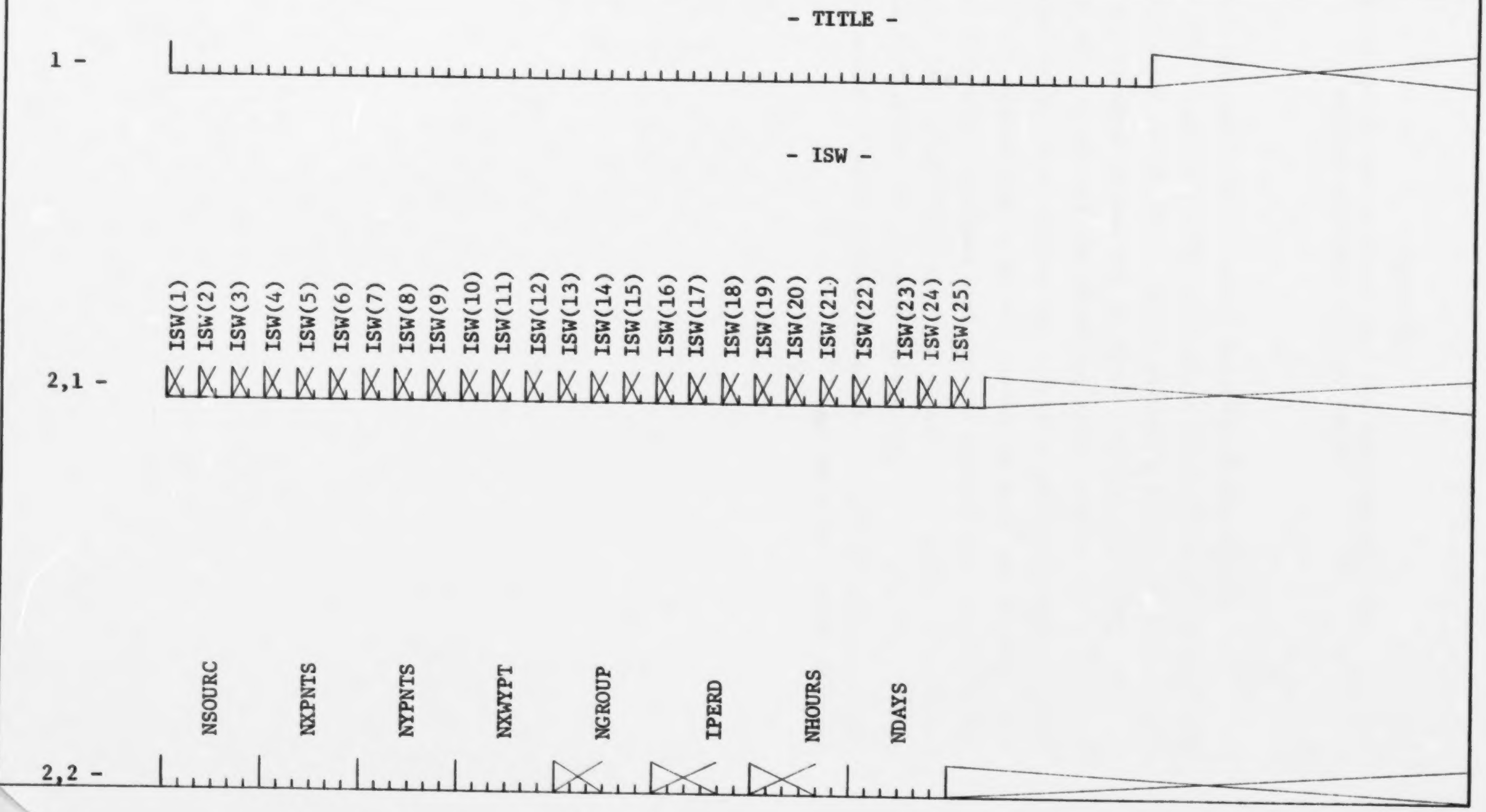
CODING FORMS FOR CARD INPUT TO THE ISC SHORT-TERM MODEL (ISCST) COMPUTER PROGRAM

This appendix contains blank coding forms used for entering input card data for the ISC short-term (ISCST) program. The card group numbers and input data parameter names correspond to those used in Section 3.2.3.a. The solid vertical lines on the coding forms define the column fields for a particular input parameter and the "x"ed areas indicate where data are ignored by the program. The coding forms are presented in the same order as the program expects the input data except for the source data coding forms. The program expects card numbers 2 through 4 to immediately follow card number 1 of Card Group 6 when applicable (NVS is greater than zero). However, it is much easier to enter the source data as presented here. An example use of these blank coding forms is shown in Appendix C with the example problem runs.

ISCST INPUT DATA CODING FORM

PROJECT	NAME
	DATE SHEET OF

CARD GROUP, CARD NUMBER	DATA CARD COLUMN
	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80
	CONTROL DATA PARAMETER AND VALUE (X means do not punch)


- TITLE -
1 -
- ISW -
ISW(1)
ISW(2)
ISW(3)
ISW(4)
ISW(5)
ISW(6)
ISW(7)
ISW(8)
ISW(9)
ISW(10)
ISW(11)
ISW(12)
ISW(13)
ISW(14)
ISW(15)
ISW(16)
ISW(17)
ISW(18)
ISW(19)
ISW(20)
ISW(21)
ISW(22)
ISW(23)
ISW(24)
ISW(25)
2,1 -
NSOURC
NXPNTS
NYPNTS
NXWYPT
NGROUP
IPERD
NHOURS
NDAYS
2,2 -

ISCST INPUT DATA CODING FORM (Continued)

PROJECT

NAME

DATE SHEET OF

CARD GROUP, CARD NUMBER

DATA CARD COLUMN

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80

RECEPTOR DATA PARAMETER AND VALUE

- GRIDX (axis of grid system, omit if NXPNTS OR NYPNTS = 0) -

3,1 -

- GRIDY (axis of grid system, omit if NXPNTS or NYPNTS = 0) -

3,2 -

ISCST INPUT DATA CODING FORM (Continued)

PROJECT

NAME

DATE SHEET OF

CARD GROUP, CARD NUMBER

DATA CARD COLUMN

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80

RECEPTOR DATA PARAMETER AND VALUE

- XDIS (discrete receptors, omit if NXWYPT = 0) -

3,3 -

- YDIS (discrete receptors, omit if NXWYPT = 0) -

3,4 -

ISCST INPUT DATA CODING FORM (Continued)

PROJECT

NAME

DATE

SHEET OF

CARD GROUP, CARD NUMBER

DATA CARD COLUMN

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80

RECEPTOR DATA PARAMETER AND VALUE

- GRIDZ (grid system and discrete receptor elevations, omit if ISW(4) = 0) -

3,5 -

ISCST INPUT DATA CODING FORM (Continued)

PROJECT

NAME

DATE SHEET OF

CARD GROUP, CARD NAME

DATA CARD COLUMN

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80

SOURCE GROUP DATA PARAMETER AND VALUE (X means do not punch)

- NSOGRP (array, omit if NGROUP = 0) -

4,1 -

- IDSOR (array, omit if NGROUP = 0) -

4,2 -

ISCST INPUT DATA CODING FORM (Continued)

PROJECT

NAME

DATE SHEET OF

CARD GROUP, CARD NUMBER

DATA CARD COLUMN

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80

METEOROLOGICAL CONSTANTS DATA PARAMETER AND VALUE (X means do not punch)

- PDEF (array, omit if ISW(21) ≠ 2) -

5,1-6 -

- DTHDEF (array, omit if ISW(22) ≠ 2) -

5,7-12 -

ZR

- UCATS (array) -

5,13 -

ISCST INPUT DATA CODING FORM (Continued)

PROJECT

NAME

DATE SHEET OF

DATA CARD COLUMN

CARD GROUP, CARD NUMBER

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80

METEOROLOGICAL CONSTANTS AND IDENTIFICATION LABEL DATA PARAMETER AND VALUE (X means do not punch)

5,14 - TK BETA1 BETA2 DECAY IQUN ICHIUN IMET ITAP

- IDAY (array, omit if ISW(19) = 2) -

5,15-19 -

- (omit if ISW(19) = 2) -

5,20 - ISS ISY IUS IUY

ISCST INPUT DATA CODING FORM (Continued)

PROJECT

NAME

DATE SHEET OF

CARD GROUP, CARD NUMBER	DATA CARD COLUMN
	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80
	SOURCE DATA PARAMETER AND VALUE

	NSO	ITYPE	WAKE	NVS	QFLG	Q	XS	YS	ZS	HS	TS	VS	D	HB	HL	HW
6,1 -																

ISCST INPUT DATA CODING FORM (Continued)

PROJECT

NAME

DATE SHEET OF

CARD GROUP, CARD NUMBER

DATA CARD COLUMN

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80

SOURCE DATA PARAMETER AND VALUE

- PHI (array, omit if NVS = 0 for all sources) -

6,2 -

ISCST INPUT DATA CODING FORM (Continued)

PROJECT

NAME

DATE SHEET OF

CARD GROUP, CARD NUMBER

DATA CARD COLUMN

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80

SOURCE DATA PARAMETER AND VALUE

- VSN (array, omit if NVS = 0 for all sources) -

6,3 -

ISCST INPUT DATA CODING FORM (Continued)

PROJECT

NAME

DATE SHEET OF

CARD GROUP, CARD NUMBER	DATA CARD COLUMN 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 SOURCE DATA PARAMETER AND VALUE
6,4 -	- GAMMA (array, omit if NVS = 0 for all sources) -

ISCST INPUT DATA CODING FORM (Continued)

PROJECT

NAME

DATE SHEET OF

CARD GROUP, CARD NUMBER

DATA CARD COLUMN

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80

SOURCE DATA PARAMETER AND VALUE

- QTK (array, omit if ISW(23) = 0 and QFLG = 0 for all sources) -

6,5 -

ISCST INPUT DATA CODING FORM (Continued)

PROJECT

NAME

DATE SHEET OF

CARD GROUP, CARD NUMBER	DATA CARD COLUMN
	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80
	HOURLY METEOROLOGICAL DATA PARAMETER AND VALUE (X means do not punch)

- (omit if ISW(19) = 1) -

7,1 -	X	JDAY	AFV	AWS	HLH	TEMP	DTHDZ	X	IST	P	DECAY	X

APPENDIX F

CODING FORMS FOR CARD INPUT TO THE ISC LONG-TERM MODEL (ISCLT) COMPUTER PROGRAM

The coding forms shown in this appendix are used to prepare the input data for the ISCLT program for card punching. If any input card has all zero values, it may be left blank because the program interprets blanks as zero. The coding forms are presented in the same order as the program expects the input data except for the source input coding forms. The source input coding forms show a form for Card Groups 17, 17a, 17b, 17c and 17d individually. This is done to make the key punching of the source data easier and to minimize the number of coding forms that must be filled out. When the source card data have been punched, *the user must reorder the source input cards in sets from Card Groups 17 through 17d, one set for each successive source.* An example use of these card input forms is shown in Appendix D with the example problems.

ISCLT INPUT DATA CODING FORM

PROJECT

NAME

DATE SHEET OF

CARD GROUP NUMBER	DATA CARD COLUMN 1–80 CONTROL DATA PARAMETER AND VALUE (X means do not punch)
1 -	- TITLE -
2 -	- ISW - ISW(1) ISW(2) ISW(3) ISW(4) ISW(5) ISW(6) ISW(7) ISW(8) ISW(9) ISW(10) ISW(11) ISW(12) ISW(13) ISW(14) ISW(15) ISW(16) ISW(17) ISW(18) ISW(19) ISW(20)
3 -	NSOURC NGROUP NXPNTS NYPNTS NXWYPT NSEASN NSPEED NSTBLE NSCTOR NOFILE
4 -	- NØCØMB (array, omit if NGRØUP=0) -
4a -	- IDSØRC (array, omit if NGROUP=0) -
5 -	- UNITS (omit if ISW(5) = 2 or 3)

ISCLT INPUT DATA CODING FORM (Continued)

PROJECT

NAME

DATE SHEET OF

CARD GROUP NUMBER

DATA CARD COLUMN

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80

RECEPTOR DATA PARAMETER AND VALUE (X means do not punch)

6 - - X (axis of grid system, omit if NXPNTS = 0 or ISW(5) = 2 or 3) -

6a - - X (arbitrarily placed receptors, omit if NXWYPT = 0 or ISW(5) = 2 or 3 & ISW(12) = 0) -

ISCLT INPUT DATA CODING FORM (Continued)

PROJECT

NAME

DATE SHEET OF

CARD GROUP NUMBER

DATA CARD COLUMN

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80

RECEPTOR DATA PARAMETER AND VALUE (X means do not punch)

- Y (axis of grid system, omit if NYPNTS = 0 or ISW(5) = 2 or 3) -

7 -

- Y (arbitrarily placed receptors, omit if NXWYPT = 0 or ISW(1) = 1 or 2) -

7a -

ISCLT INPUT DATA CODING FORM (Continued)

PROJECT

NAME

DATE SHEET OF

CARD GROUP NUMBER	DATA CARD COLUMN 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80
	RECEPTOR DATA PARAMETER AND VALUE (X means do not punch)
8 -	- Z (grid system elevations, omit if ISW(4) = 0 or ISW(5) = 2 or 3 or NXPNTS = 0) -

ISCLT INPUT DATA CODING FORM (Continued)

PROJECT

NAME

DATE SHEET OF

CARD GROUP NUMBER

DATA CARD COLUMN

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80

RECEPTOR DATA PARAMETER AND VALUE (X means do not punch)

- Z (grid system elevations, continued) -

8 -
(Cont.)

ISCLT INPUT DATA CODING FORM (Continued)

PROJECT

NAME

DATE SHEET OF

CARD GROUP NUMBER

RECEPTOR DATA PARAMETER AND VALUE (X means do not punch)

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80

- Z (arbitrarily spaced receptors, omit if ISW(4) = 0, NXWYPT = 0, ISW(5) = 2 or 3 and ISW(12) = 0 -

8a -

ISCLT INPUT DATA CODING FORM (Continued)

PROJECT

NAME

DATE SHEET OF

CARD GROUP NUMBER

DATA CARD COLUMN

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80

METEORLOGICAL DATA PARAMETER AND VALUE (X means do not punch)

9 - - FMT (omit if ISW(5) = 2 or 3 or ISW(18) = 0) -

9a - - FREQ (omit if ISW(5) = 2 or 3 -

ISCLT INPUT DATA CODING FORM (Continued)

PROJECT

NAME

DATE SHEET OF

CARD GROUP NUMBER	DATA CARD COLUMN
	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80
	METEOROLOGICAL DATA PARAMETER AND VALUE (X means do not punch)
9a - (Cont.)	- FREQ (Continued) -

ISCLT INPUT DATA CODING FORM (Continued)

PROJECT

NAME

DATE SHEET OF

CARD GROUP NUMBER

DATA CARD COLUMN

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80

METEOROLOGICAL DATA PARAMETER AND VALUE (X means do not punch)

- TA (omit if ISW(5) = 2 or 3) -

10 -

- HM (omit if ISW(5) = 2 or 3) -

11 -

ISCLT INPUT DATA CODING FORM (Continued)

PROJECT

NAME

DATE SHEET OF

CARD GROUP NUMBER

DATA CARD COLUMN

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80

METEOROLOGICAL DATA PARAMETER AND VALUE (X means do not punch)

- HM (Continued) -

11 - (Cont.)

- DPDZ (omit if ISW(5) = 2 or 3) -

12 -

- (omit if ISW(5) = 2 or 3) -

13 -	ROTATE	TK	ZR	BETA1	BETA2	G	DECAY

- UBAR (omit if ISW(5) = 2 or 3) -

14 -

ISCLT INPUT DATA CODING FORM (Continued)

PROJECT

NAME

DATE SHEET OF

CARD GROUP NUMBER

DATA CARD COLUMN

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80

METEOROLOGICAL DATA PARAMETER AND VALUE (X means do not punch)

- PHI (omit if ISW(5) = 2 or 3) -

15 -

- P (omit if ISW(5) = 2 or 3) -

16 -

ISCLT INPUT DATA CODING FORM (Continued)

PROJECT

NAME

DATE SHEET OF

CARD GROUP NUMBER	DATA CARD COLUMN														
	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80														
	SOURCE DATA PARAMETER AND VALUE														
17 -	NUMS	DISP	TYPE	QFLG	DX	DY	H	ZS	TS or SIGYO or XO	VEL or SIGZO	D	HB	BW	WAKE	NVS

ISCLT INPUT DATA CODING FORM (Continued)

PROJECT

NAME

DATE SHEET OF

CARD GROUP NUMBER

DATA CARD COLUMN

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80

SOURCE PARAMETER AND VALUE

17a - - VS (omit if NVS = 0) -

ISCLT INPUT DATA CODING FORM (Continued)

PROJECT

NAME

DATE SHEET OF

CARD GROUP NUMBER

DATA CARD COLUMN

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80

SOURCE DATA PARAMETER AND VALUE

17b - - FRQ (omit if NVS = 0) -

ISCLT INPUT DATA CODING FORM (Continued)

PROJECT

NAME

DATE SHEET OF

CARD GROUP NUMBER

DATA CARD COLUMN

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80

SOURCE DATA PARAMETER AND VALUE

17c - - GAMMA (omit if NVS = 0) -

ISCLT INPUT DATA CODING FORM (Continued)

PROJECT

NAME

DATE SHEET OF

CARD GROUP NUMBER

DATA CARD COLUMN

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80

SOURCE DATA PARAMETER AND VALUE (X means do not punch)

17d -

- Q -

APPENDIX G

THE METEOROLOGICAL PREPROCESSOR PROGRAM FOR ISCST

G.1 INTRODUCTION

Hourly meteorological inputs to the Industrial Source Complex (ISC) Dispersion Model short-term computer program ISCST may be input by card deck or by the meteorological data tape or file generated by the Single Source (CRSTER) Model preprocessor program. The following discussion of the preprocessor program is principally based on Section 4.2 and Appendix A of the User's Manual for the Single Source (CRSTER) Model (EPA, 1977).

G.2 DESCRIPTION OF THE PREPROCESSOR PROGRAM

The preprocessor program generates a magnetic tape of hourly values of the meteorological input parameters required by the ISC Model short-term computer program ISCST. These parameters include wind speed, wind direction, mixing height, stability category and ambient air temperature. The inputs required by the preprocessor program are: (1) hourly National Weather (NWS) observations of surface wind speed, wind direction, temperature, cloud cover and ceiling height in magnetic tape format; and (2) daily minimum and maximum mixing heights in punched card format, as determined from NWS 1200 GMT upper air temperature soundings, using the methods of Holzworth (1972). The preprocessor program, in addition to generating the meteorological data for the ISCST program, performs checks for missing data on the tape of hourly surface observations and prints diagnostic messages for any discrepancies that are detected. Quality checks are not performed on mixing height data input to the preprocessor program. Consequently, it is recommended that the user review the mixing height data.

Data for each day are read by the preprocessor program and processed one hour at a time. The cloud ceiling height, wind speed and sky cover data are used to classify the atmospheric stability for each hour. The wind speed is converted from the input units of knots to meters per second, as required by the ISC Model. A flow vector (indicating plume direction) is calculated from the hourly mean wind direction. In addition, a randomized flow vector is computed to account for the natural turbulent fluctuations of the wind that are not reflected in hourly wind-direction observations reported to the nearest 10-degree sector. Hourly mixing heights for both rural and urban conditions are derived from the morning (daily minimum) and afternoon (daily maximum) mixing height data (see Section 2.4.1.2).

The preprocessor program is written in FORTRAN V language for execution on a UNIVAC 1100 series computer and is compatible with most FORTRAN IV compilers on other types of computers. A program listing for the preprocessor program is contained in Section G.7. Figure G-1 is a flow diagram of the functions performed by the preprocessor program.

G.3 CONTROL LANGUAGE AND DATA DECK SETUP

G.3.1 Control Language Requirements

The following runstream illustrates the Executive Control Language (ECL) required to execute the preprocessor program on a UNIVAC 1100 Series Operating System:

```
@RUN . . .
@ASG,A  prog-file
@ASG,A  cd144-file
@USE    8,cd144-file
@ASG,CP met-file
@USE 9, met-file
@XQT    prog-file.PREP
card input data deck
@FIN
```

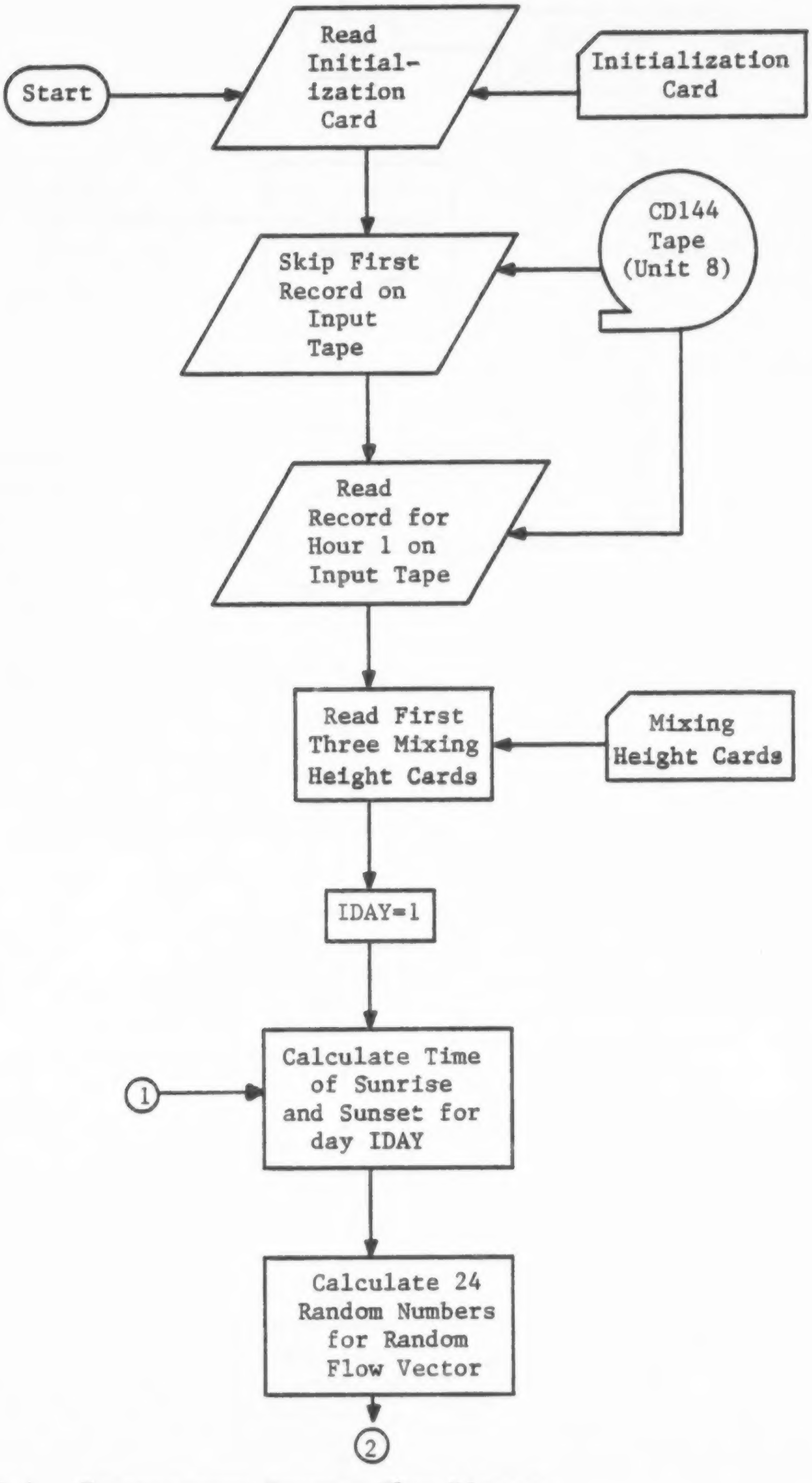

Start
Read Initial-ization Card
Initialization Card
CD144 Tape (Unit 8)
Skip First Record on Input Tape
Read Record for Hour 1 on Input Tape
Read First Three Mixing Height Cards
Mixing Height Cards
IDAY=1
①
Calculate Time of Sunrise and Sunset for day IDAY
Calculate 24 Random Numbers for Random Flow Vector
②

FIGURE G-1. Preprocessor Program Flow Diagram

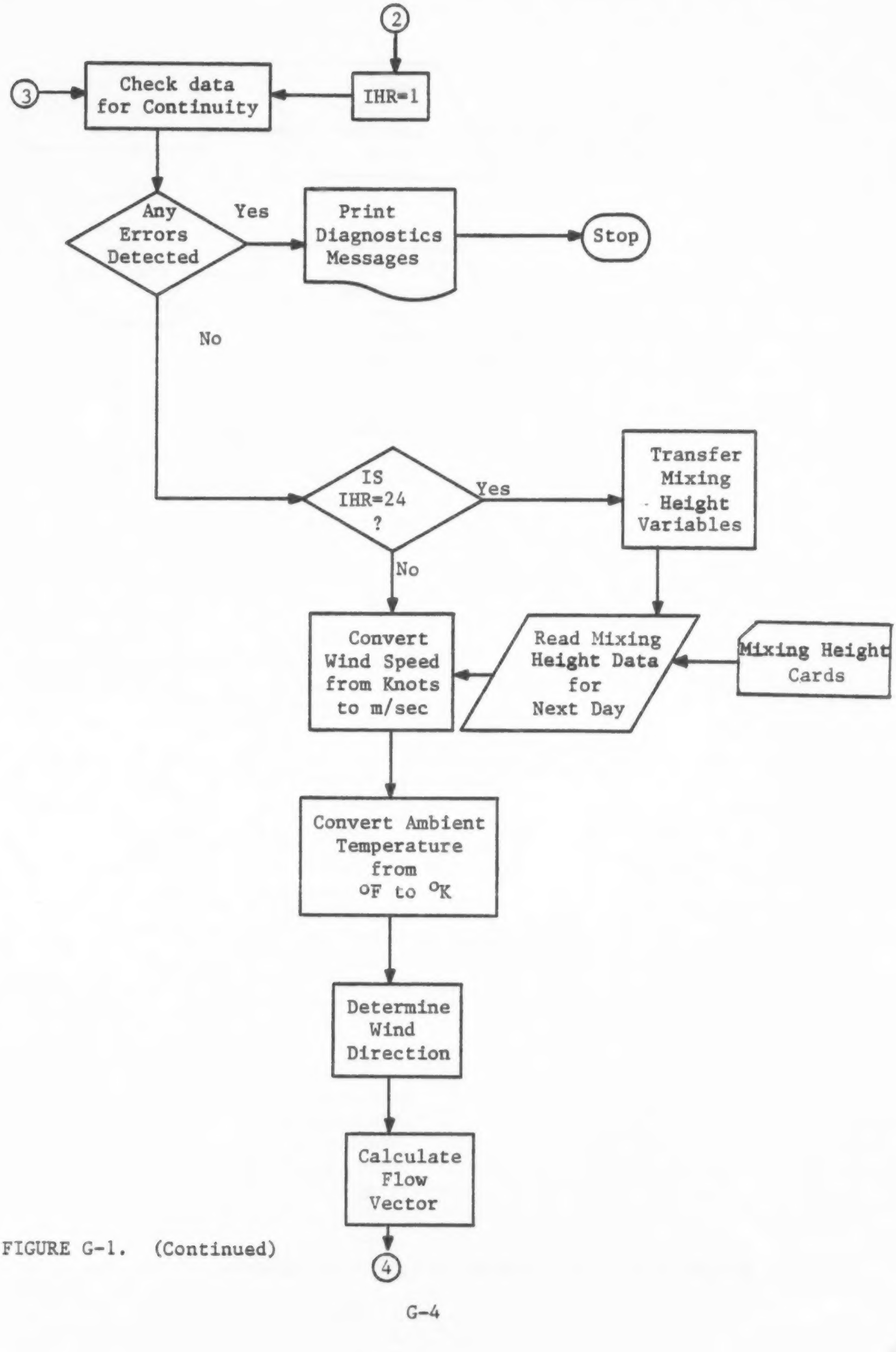

2
3
Check data for Continuity
IHR=1
Any Errors Detected
Yes
Print Diagnostics Messages
Stop
No
IS IHR=24 ?
Yes
Transfer Mixing Height Variables
No
Convert Wind Speed from Knots to m/sec
Read Mixing Height Data for Next Day
Mixing Height Cards
Convert Ambient Temperature from °F to °K
Determine Wind Direction
Calculate Flow Vector
4

FIGURE G-1. (Continued)

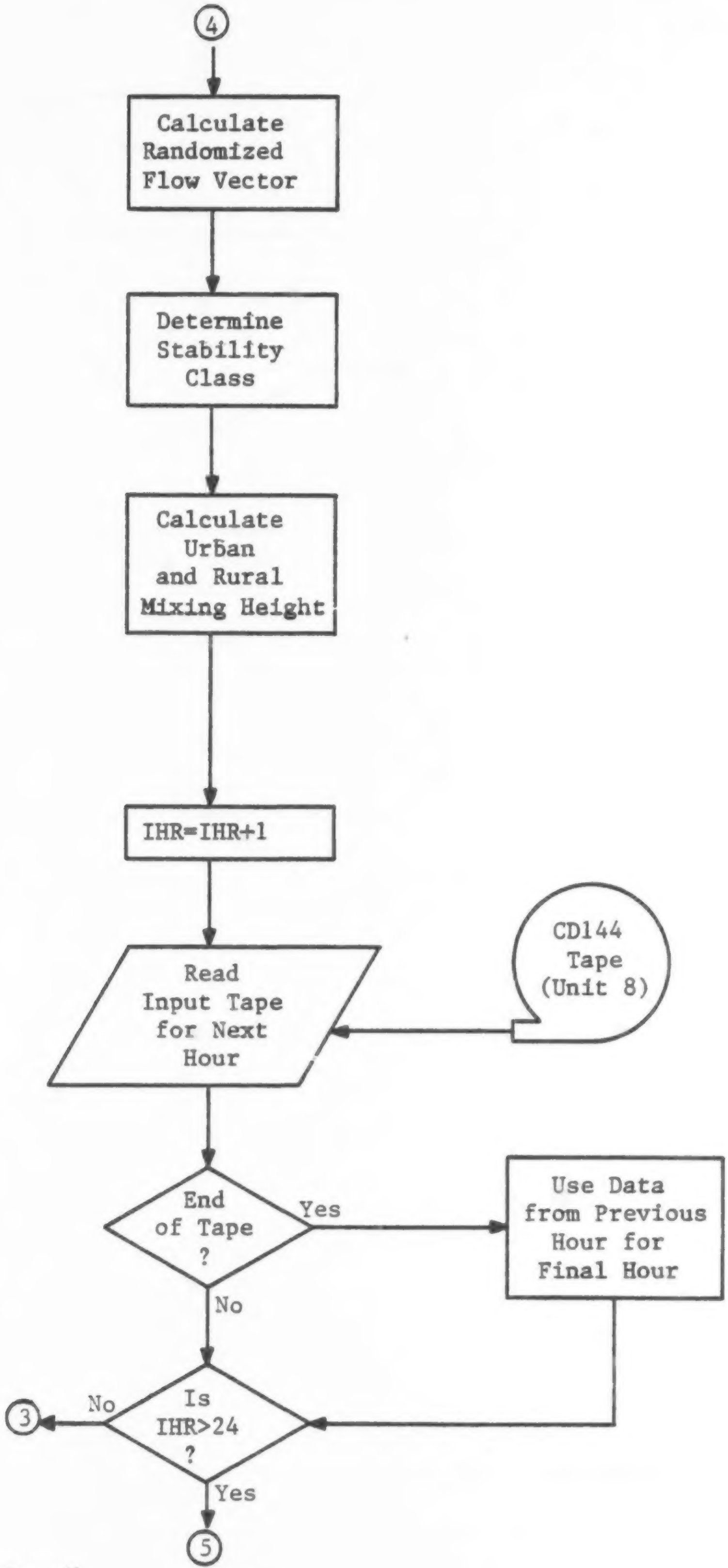

4
Calculate Randomized Flow Vector
Determine Stability Class
Calculate Urban and Rural Mixing Height
IHR=IHR+1
Read Input Tape for Next Hour
CD144 Tape (Unit 8)
End of Tape ?
Yes
Use Data from Previous Hour for Final Hour
No
Is IHR>24 ?
No
3
Yes
5

FIGURE G-1. (Continued)

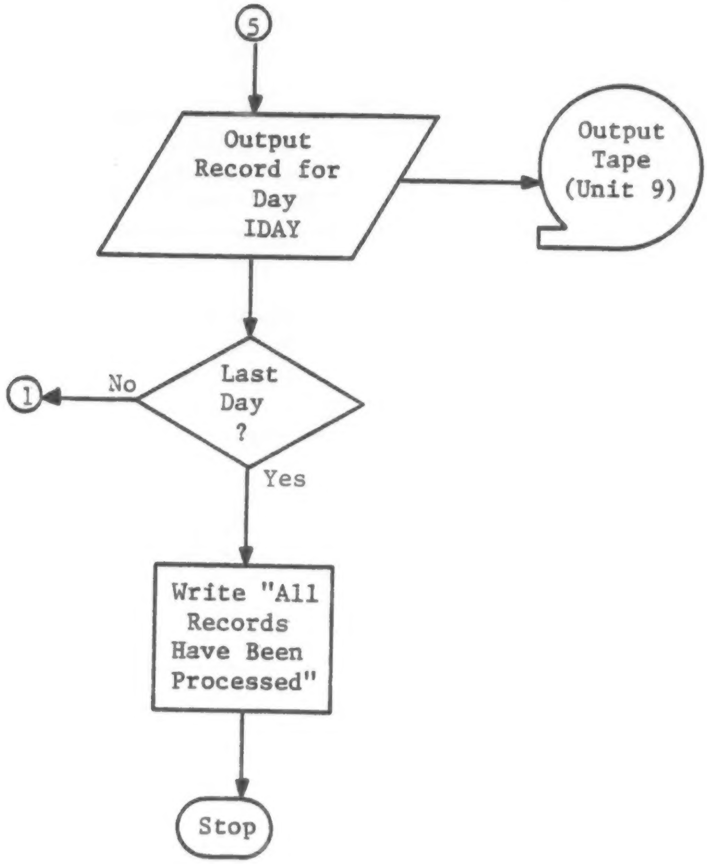

5
Output Record for Day IDAY
Output Tape (Unit 9)
Last Day ?
No
1
Yes
Write "All Records Have Been Processed"
Stop

FIGURE G-1. (Continued)

where:

prog-file = name of program file containing the preprocessor absolute element

cd144-file = the file name assigned to the input data file of hourly meteorology in card deck 144 format

met-file = name to be assigned to the output file of combined hourly surface and upper air meteorological data

card input data deck = the initialization card followed by the set of mixing height cards

The following IBM Job Control Language (JCL) is required to compile, line-edit and execute the preprocessor program on an IBM System/360 Operating System:

```
//jobno JOB (account),'name',TIME=time
//EXEC FORTGCLG,COND=(4,LT)
//FORT.SYSIN DD *
source deck
//GO.FT08F001 DD DSN=CD144,UNIT=2400,VOL=SER=xxxxxx,DISP=OLD,
//LABEL=(,NL),DCB=(RECFM=FB,LRECL=80,BLKSIZE=800)
//GO.FT09F001 DD DSN=met-file,UNIT-2400,DISP=(NEW,KEEP),
//VOL=SER=yyyyyy,DCB=(RECFM=VBS, LRECL=779,BLKSIZE=7794)
card input data deck
/*
```

where:

jobno = job number

account = accounting information (system dependent)

name = programmer's name

time = estimated CPU time requirement

source deck = the preprocessor program source deck on cards

xxxxxx = volume serial number of the tape containing the hourly meteorological data file in card deck 144 format

met-file = name to be assigned to the output meteorological data file

yyyyyy = volume serial number of the tape to receive the output data file

card input data deck = card input file consisting of the initialization card followed by the set of mixing height cards

This example assumes that the input will be on a nonlabeled tape with a block size of 800. This is representative of the form in which the data are issued by the National Climatic Center. The output file in this example is also on tape with a blocking factor of 10 records per block.

G.3.2 Data Deck Setup

The data card deck required for input to the preprocessor program must be set up as follows:

- Preprocessor initialization card
- Mixing height card for December 31 of the year preceding the year of record
- Mixing height card for January 1 of the year of record
- Mixing height card for January 2 of the year of record

⋮

- Mixing height card for December 30 of the year of record
- Mixing height card for December 31 of the year of record
- Mixing height card for January 1 of the year following the year of record

The preprocessor program initialization card contains values for data items that must be initialized for each run. The mixing height cards contain the morning and afternoon mixing heights for the corresponding day. The methodology for calculating hourly mixing heights from the twice daily mixing heights involves interpolations using the afternoon mixing height from the preceding day and both mixing heights from the following day (see Section 2.4.1.2). For this reason, the mixing heights for the last day of the year preceding the year of record must be included as the first mixing height card and the mixing heights for the first day of the year following the year of record must be included as the last mixing height card. If these data are not available, the data for the first and last days of the year of record can be substituted, respectively. The contents and formats of the preprocessor initialization card and mixing height cards are described below.

G.4 INPUT DATA DESCRIPTION

G.4.1 Card Input

Card input requirements for the preprocessor program consists of an initialization card followed by a set of mixing height cards. The preprocessor program initialization card contains information to initialize the following items:

- NWS meteorological surface station number
- Year of record
- Latitude of the surface station
- Longitude of the surface station
- Time zone of the surface station
- Number of days in the year
- Initial value for generating random numbers

Table G-1 is a description of the format of the initialization card.

The set of mixing height cards is composed of one card for the last day of the year preceding the year of record, one card for each day of the year of record, and one card for the first day of the next year. Each card contains the NWS upper air station number, the date, and the values for the morning and afternoon mixing heights. Table G-2 is a description of the format for the mixing height cards. The twice daily mixing height cards must be punched from either magnetic tape or printed tabular data for an appropriate NWS upper air station for the year of record. Mixing height data on tape are available from the National Climatic Center (NCC), Asheville, North Carolina. These tapes store one day of data per 34-character record using the format shown in Table G-3, with 10 records to a block. Note that the afternoon mixing height column numbers on the NCC tapes are not the same as those required on the preprocessor program mixing height data cards.

G.4.2 Tape Input Requirements

Magnetic tapes containing card images of the hourly meteorological data in "Card Deck 144 format" required by the preprocessor program are available from the NCC. These data can also be

TABLE G-1

PREPROCESSOR INITIALIZATION CARD FORMAT

Card Columns	Format	Description
1-5	I5	NWS Surface Station WBAN Number
6-7	I2	Year of Surface Data
8		Blank
9-18	F10.1	Latitude of the Surface Station (degrees to hundredths)
19-28	F10.1	Longitude of the Surface Station (degrees to hundredths)
29-30	F2.0	Time zone in which the Surface Station is located: 05 = Eastern 06 = Central 07 = Mountain 08 = Pacific
31-34	I4	Number of days in the year of record (365 for non-leap years; 366 for leap years)
35-44	F10.0	Random Number Seed*

*NOTE: The user is cautioned with regard to the random number generator used in the preprocessor program. The subroutine called in this program is entitled RANDU and is provided by Sperry Rand Corporation for use on the Environmental Protection Agency's Univac 1110. The user must contact his system personnel to obtain a suitable alternative to the RANDU subroutine. Because the same random number generator will not be used by all users, the randomized flow vectors may differ when comparing preprocessor file results from two different computers.

TABLE G-2
PREPROCESSOR MIXING HEIGHT DATA CARD FORMAT

Card Columns	Format	Description
1-5	I5	NWS Upper Air Station WBAN Number
6-7	I2	Year of record (last two digits)
8-9	I2	Month
10-11	I2	Day
12	1X	Blank
13-17	F5.0	Morning Mixing Height (m)
18-30	13X	Blank
31-35	F5.0	Afternoon Mixing Height (m)

TABLE G-3
DATA RECORD FORMAT FOR NCC MAGNETIC TAPES OF MORNING AND AFTERNOON MIXING HEIGHTS

Record Positions	Format	Description
1-5	I5	NWS Upper Air Station WBAN Number
6-7	I2	Year of record (last two digits)
8-9	I2	Month
10	I1	Season (1 = Dec. -Feb., 2= Mar. -May, 3 = June -Aug., 4 = Sept. -Nov.)
11-12	I2	Day
13	A1	Type Code (P = precipitation, C = morning average temperature plus 5°C is less than 1200 GMT surface temperature, M = missing)
14-17	I4	Morning Mixing Height (m)
18-20	I3	Morning* Surface Wind Speed (m s^{-1})
21-23	I3	Morning Wind Speed Averaged from Surface through Mixing Layer (m s^{-1})
24	A1	Type Code (P = precipitation, C = afternoon average temperature is less than 1200 GMT surface temperature, M = missing)
25-28	I4	Afternoon Mixing Height (m)
29-31	I3	Afternoon** Surface Wind Speed (m s^{-1})
32-34	I3	Afternoon Wind Speed Averaged from Surface through Mixing Layer (m s^{-1})

* 0200-0600 LST ** 1200-1600 LST

obtained as 8,784 punched cards. Each tape file contains one card image record for each hour. The format of these records is described in the Card Deck 144 WBAN Hourly Surface Observations Reference Manual (NCC, 1970). Data on this file used by the preprocessor program include the station number, year, month, day, hour, cloud ceiling height, wind direction, wind speed, dry bulb temperature and total opaque sky cover. Table G-4 is a description of the format for these data items required by the preprocessor program.

If data for an NWS surface observation station have not been processed into tape format by the NCC, the data can be coded from printed copies of the WBAN Form A observations, also available from NCC. Instructions for coding the data in Card Deck 144 format are given in the Card Deck 144 Reference Manual (NCC, 1970). Only the items required by the preprocessor program need to be coded.

G.5 OUTPUT DATA DESCRIPTION

The output tape from the preprocessor program consists of a sequential file containing a file identification record followed by one record for each day in the year.

The file identification record contains the year of record for the surface meteorological data, the surface station identification number, the year of record for the mixing height data, and the upper air station identification number.

Each of the daily records contain the year, month, and the Julian Day followed by 24 values of stability category, wind speed, temperature, flow vector, randomized flow vector, and rural and urban mixing heights. Because the last record on the input tape corresponds to the 23rd hour of the last day, the data for that hour are also used for the 24th hour on the last record on the output tape.

TABLE G-4

DATA RECORD FORMAT FOR NCC MAGNETIC TAPES OF CD 144 SURFACE DATA - PREPROCESSOR REQUIRED DATA ONLY

Record Positions	Format	Description
1-5	I5	NWS Surface Station WBAN Number
6-7	I2	Year of Record (last two digits)
8-9	I2	Month
10-11	I2	Day
12-13	I2	Hour
14-16	3A1	Ceiling Height
17-38	22X	Blank
39-40	I2	Wind direction (Tens of degrees)
41-42	I2	Wind speed (Knots)
43-46	4X	Blank
47-49	I3	Temperature
50-78	29X	Blank
79	A1	Opaque
80	1X	Blank

All records on the output file are written with an unformatted FORTRAN write statement. The output files, therefore, are machine and compiler dependent and cannot be directly accessed by the ISCST program on systems and compilers different from the computer or compiled program creating the file.

The four parameters on the file identification record and the year, month and stability category on each of the daily records are stored as FORTRAN integer variables. All other values on the daily records are FORTRAN real number variables. Table G-5 is a description of the arrangement of the variables on each of the daily records.

Assuming no fatal error messages, the entire preprocessor file is printed and successful run completion is indicated by the message:

```
ALL RECORDS HAVE BEEN PROCESSED
```

G.6 DIAGNOSTIC MESSAGES

The two types of diagnostic messages that may be generated by the preprocessor program are fatal error messages and informative messages. Fatal error messages are printed when an inconsistency is detected in the input data, causing the program to terminate execution. Table G-6 is a list of all possible fatal error messages and the corrective action that should be taken. Informative messages are printed when anomalous data items are detected. No user action is necessary in response to an informative message unless the assumptions made by the program adversely affect the results. Table G-7 is a list of the informative messages in the preprocessor program.

TABLE G-5

PREPROCESSOR OUTPUT FILE RECORD DESCRIPTION

Position of Variable Within the Record	Variable Name	Fortran Variable Type	
1	IYEAR	INTEGER	Year of record (last two digits)
2	IMONTH	INTEGER	Month
3	DAY1	REAL	Julian Day
4-27	KST	INTEGER	Array of 24 Stability Category Values
28-51	SPEED	REAL	Array of 24 Wind Speed Values (m s^{-1})
52-75	TEMP	REAL	Array of 24 Ambient Temperature Values (^{o}K)
76-99	AFV	REAL	Array of 24 Flow Vector Values (degrees)
100-123	FVR	REAL	Array of 24 Randomized Flow Vectors (degrees)
124-171	HLH	REAL	Array dimensioned 2 by 24 containing 24 rural mixing height values and 24 urban mixing height values (m). The values are stored on the record in groups of two for each hour with the rural mixing height first followed by the urban mixing height for that hour

TABLE G-6

PREPROCESSOR FATAL ERROR MESSAGES

```
ID DOES NOT MATCH IN RECORD # i   ID ON TAPE IS n   ID REQUESTED IS k
*****DATA IS MISSING.   PLEASE CORRECT INPUT FILE*****†
```

Description:	This message is printed if the surface station identification entered on the preprocessor initialization card does not match the station number on a record in the hourly meteorological data file. The value i is the number of the record within the file, n is the station number on the record, and k is the station number requested.
Action:	If i = 1, check the surface station number input on the preprocessor initialization card and the input meteorological data file to be sure that the correct file was input. If i > 1, the input file is bad. A listing of the file should be inspected to determine what corrective action is necessary.

```
YEAR IS i INSTEAD OF j IREC = n
```

Description:	The year i on record number n of the meteorological data file did not match the year j input on the preprocessor initialization card.
Action:	If n = 1, check to be sure that the correct year was entered on the preprocessor initialization card and that the correct input file was used. If n > 1, the data file is in error. A listing of the file should be inspected to determine what corrective action is necessary. If n > 8,760, check to be sure the number of days entered on the preprocessor initialization card is correct.

†This line appears on fatal error messages for ID, YEAR, MONTH, DAY, HOUR

TABLE G-6 (Continued)

MONTH i DOES NOT AGREE WITH LOOP j IREC = n	
Description:	The month i on input record n of the meteorological data file is out of sequence. The month should have been number j.
Action:	If i = 2 and j = 3, check to be sure the number of days entered on the preprocessor initialization card was 365 for a non-leap year. If i = 3 and j = 2, check to be sure that the number of days entered on the preprocessor initialization card was 366 for a leap year. If the number of days input was incorrect, enter the appropriate value and rerun preprocessor. Otherwise, inspect a listing of the input file for missing or extraneous records. If the file is out of order, sort the file in ascending order keying on columns 1-13.
DAY i DOES NOT AGREE WITH LOOP j IREC = n	
Description:	The day i on input record n of the meteorological data file is out of sequence. The day should have been number j.
Action:	Inspect a listing of the input file for missing or extraneous records. If the file is out of order, sort the file in ascending order keying on columns 1-13.
HOUR i DOES NOT AGREE WITH LOOP j IREC = n	
Description:	The hour i on record n of the input meteorological data file was out of sequence. The hour expected was hour j. This message is printed for hours 1 through 23, for which the value on the input record should equal the value of the index of the hourly 'DO' loop.
Action:	Inspect a listing of the input file for missing or extraneous records. If the file is out of order, sort the file in ascending order keying on columns 1-13.

TABLE G-6 (Continued)

ERROR: MISSING HOUR LOOP VALUE = j WHILE VALUE ON RECORD n IS i	
Description:	This message is printed if the last hour of the day being processed (j = 24) is not the data for the first record of the next day (i = 0).
Action:	Inspect a listing of the meteorological data file for missing or extraneous records. If the file is out of order, sort the file, keying on columns 1-13.

TABLE G-7

PREPROCESSOR INFORMATIVE MESSAGES

THE CHARACTER x IS NOT ALLOWABLE. CLOUD COVER DEFAULTS TO 10.	
Description:	The cloud cover on a record in the input meteorological data file was value x. The only valid values for cloud cover are 0,1,2,3,4,5,6,7,8,9 or -. The program assumes a value of "-" which is interpreted as a 10 tenths cloud cover.
STABILITY = i j r n	
Description:	A stability class was assigned an invalid value (i). The value j is the wind speed index, r is the net radiation index number, and n is the number of the input meteorological data file record being processed.

G.7 FORTRAN LISTING OF THE CRSTER/ISCST PREPROCESSOR PROGRAM

The following is a complete FORTRAN source listing of the CRSTER/ISCST preprocessor program.

```
C***CRSTER-PREPROCESSOR- WRITTEN BY JOAN HRENKO NOVAK                    MET00010
C*** BASED ON METHODS SUGGESTED BY TURNER , ZIMMERMAN, AND IRWIN.        MET00020
C*** VERSION 77166                                                       MET00030
C***THE PROGRAM ASSUMES THERE IS NO MISSING DATA ON THE MET. TAPE.       MET00040
C***IF MISSING DATA IS DETECTED, THE LOCATION OF THE MISSING DATA IS     MET00050
C***PRINTED. MISSING DATA MUST BE FILLED IN BEFORE PROCEEDING .          MET00060
      DIMENSION LSTAB(12,7), IDFAC(12,2), ANGL(3), ICEIL(3), IDG(3), IDIMET00070
     1G(11)                                                              MET00080
      DIMENSION KST(24), SPEED(24), TEMP(24), AFV(24), FVR(24), HLH(2,24MET00090
     1), RAND(24)                                                        MET00100
      DATA IDIG /"0","1","2","3","4","5","6","7","8","9","-"/            MET00110
      DATA IREC /1/ ,INO /1/ ,ANGL /60.,35.,15./ ,CONST /57.29578/       MET00120
      DATA IDFAC /0,31,59,90,120,151,181,212,243,273,304,334,0,31,60,91,MET00130
     1121,152,182,213,244,274,305,335/                                   MET00140
      DATA LSTAB /7,7,7,6,6,6,5,5,5,5,4,4,6,6,6,5,5,5,4,4,4,4,4,4,4,4,4,MET00150
     14,4,4,4,4,4,4,4,4,3,3,3,4,4,4,4,4,4,4,4,4,2,2,2,3,3,3,3,3,3,4,4,4,MET00160
     21,2,2,2,2,2,2,3,3,3,3,4,1,1,1,1,1,2,2,2,2,3,3,3/                   MET00170
C***   UNIT 8 = SURFACE DATA                                             MET00180
C***   UNIT 9 = OUTPUT FILE                                              MET00190
C***   UNIT 5 = UPPER AIR DATA IN CARD FORMAT                            MET00200
      IN=5                                                               MET00210
      IO=6                                                               MET00220
      IFLAG=0                                                            MET00230
C***READ CARD TO INITIALIZE MET TAPE ID,YEAR,LATITUDE,LONGITUDE,         MET00240
C*** TIME ZONE ,NO. OF DAYS IN YEAR, INITIAL RANDOM NUMBER.              MET00250
C***RAND(24) IS THE INITIAL RANDOM NO. USED TO GENERATE THE SEQUENCE OF MET00260
C***NUMBERS FOR THE RANDOMIZED FLOW VECTOR. IF THE SAME NO. IS USED IN  MET00270
C***DIFFERENT EXECUTIONS OF THE PREPROCESSOR, THE SAME SET OF RANDOM NOSMET00280
C***WILL BE GENERATED. ANY ODD NUMBER GREATER THAN 3 DIGITS CAN BE USED MET00290
C***AS THE SEED. THIS SEED IS MULTIPLIED BY 10000 INTERNALLY.            MET00300
C***ZONE IS GMT-LST.                                                     MET00310
      READ (IN,400) IDC,IYRC,ALAT,ALONG,ZONE,NDAYS,RAND(24)              MET00320
      WRITE (IO,410) IDC,IYRC,ALAT,ALONG,ZONE,NDAYS,RAND(24)             MET00330
      DUM=ALAT/CONST                                                     MET00340
      SINLAT=SIN(DUM)                                                    MET00350
      COSLAT=COS(DUM)                                                    MET00360
      DUM=ALONG/15.-ZONE                                                 MET00370
      TEMPZ=15.*ZONE-ALONG                                               MET00380
```

```
C***RESET SUBSRIPT IF LEAP YEAR                                         MET00390
      LYS=1                                                             MET00400
      IF (NDAYS.EQ.366) LYS=2                                           MET00410
C***READ MET DATA                                                       MET00420
C***THIS READ ASSUMES AN INPUT TAPE WITH HOURLY DATA FROM THE           MET00430
C***NATIONAL CLIMATIC CENTER, ASHVILLE, NC. IN THEIR STANDARD           MET00440
C***HOURLY CARD FORMAT.                                                 MET00450
C***SKIP 00 HOUR OF MET DATA.                                           MET00460
      READ (8,420) ID,IYEAR,IMONTH,IDAY,IHOUR,ICEIL,IDIR,ISPEED,ITEMP,ICMET00470
     1OVER                                                              MET00480
      LWD=IDIR                                                          MET00490
C***BEGIN PROCESSING WITH HOUR 01                                       MET00500
      READ (8,420) ID,IYEAR,IMONTH,IDAY,IHOUR,ICEIL,IDIR,ISPEED,ITEMP,ICMET00510
     1OVER                                                              MET00520
C***MIXING HEIGHT VALUES ARE DETERMINED TWICE A DAY FROM RADIOSONDE DATAMET00530
C***USING THE PROCEDURES OF HOLZWORTH.                                  MET00540
C***READ PRIOR DAYS MIXING HEIGHT VALUES                                MET00550
      READ (IN,430) XMNM1,XAFM1                                         MET00560
C***PRESENT DAY                                                         MET00570
      READ (IN,440) IDM,IYM,XMN,XAF                                     MET00580
C***WRITE IDENTIFYING INFORMATION ON OUTPUT FILE                        MET00590
      WRITE (9) ID,IYEAR,IDM,IYM                                        MET00600
      WRITE (10,450) IYEAR,ID,IYM,IDM                                   MET00610
C*** READ NEXT DAY'S MIXING HEIGHT VALUES                               MET00620
      READ (IN,430) XMNP1,XAFP1                                         MET00630
C***START DAY LOOP.                                                     MET00640
      DO 380 IDY=1,NDAYS                                                MET00650
C***CALCULATE THE DAY NO AND THE TIME OF SUNRISE AND SUNSET             MET00660
      DAY1=IDAY+IDFAC(IMONTH,LYS)                                       MET00670
C***CONSTANT 0.0172028=360./365.242*57.29578                            MET00680
C***DETERMINE THE ANGULAR(RADIANS) FRACTION OF A YEAR FOR THIS DATE.    MET00690
      DAYNO=(DAY1-1.0)*0.0172028                                        MET00700
      TDAYNO=2.*DAYNO                                                   MET00710
      SIND=SIN(DAYNO)                                                   MET00720
      COSD=COS(DAYNO)                                                   MET00730
      SINTD=SIN(TDAYNO)                                                 MET00740
      COSTD=COS(TDAYNO)                                                 MET00750
C***ACCOUNT FOR ELLIPTICITY OF EARTH'S ORBIT.                           MET00760
```

```
      SIGMA=279.9348+(DAYNO*CONST)+1.914827*SIND-0.079525*COSD+0.019938*MET00770
     1SINTD-0.00162*COSTD                                               MET00780
C***CONSTANT 0.39785=SIN(.4091720193=23.44383/57.29578)                 MET00790
C***FIND THE SINE OF THE SOLAR DECLINATION.                             MET00800
      DSIN=0.39785*SIN(SIGMA/CONST)                                     MET00810
      DCOS=SQRT(1.0-DSIN*DSIN)                                          MET00820
C***DETERMINE TIME(HRS) OF MERIDIAN PASSAGE                             MET00830
      AMM=12.0+0.12357*SIND-0.004289*COSD+0.153809*SINTD+0.060783*COSTD MET00840
      HCOS=(-SINLAT*DSIN)/(COSLAT*DCOS)                                 MET00850
C***DETERMINE SOLAR HOUR ANGLE OF SUNRISE-SUNSET.                       MET00860
      H2=(ATAN2(SQRT(1.-HCOS*HCOS),HCOS)/15.0)*CONST                    MET00870
C***TIME OF SUNRISE(TSR) AND TIME OF SUNSET(TSS) ARE EXPRESSED IN       MET00880
C***LOCAL STANDARD TIME SINCE THE ZONE CORRECTION HAS ALREADY BEEN MADE.MET00890
C***OTHERWISE THEY WOULD BE IN GREENWICH MEAN TIME.                     MET00900
      TSR=AMM-H2+DUM                                                    MET00910
      TSS=AMM+H2+DUM                                                    MET00920
      RAND(1)=RAND(24)*10000.                                           MET00930
C***THIS CALL TO THE UNIVAC RANDOM NO. GENERATOR PROVIDES 24 UNIFORMLY  MET00940
C***DISTRIBUTED NUMBERS BETWEEN 0 AND 1.                                MET00950
C***IF THIS ROUTINE IS NOT RUN ON A UNIVAC MACHINE, THE RANDOM NO.      MET00960
C***GENERATOR FOR THE USER'S SYSTEM MAY BE SUBSTITUTED.                 MET00970
      CALL RANDU (RAND,24)                                              MET00980
C***START HOUR LOOP                                                     MET00990
      DO 370 KHR=1,24                                                   MET01000
      KHRC=KHR                                                          MET01010
C***INITIALIZE STABILITY BEFORE IT IS CALCULATED                        MET01020
      KST(KHR)=0                                                        MET01030
      IF (KHR.EQ.24) GO TO 70                                           MET01040
C***CHECK DATA FOR CORRECTNESS & CONTINUITY                             MET01050
C***CHECK STATION NUMBER.                                               MET01060
      IF (ID.EQ.IDC) GO TO 10                                           MET01070
      WRITE (IO,460) IREC,ID,IDC                                        MET01080
      WRITE (IO,510)                                                    MET01090
      CALL EXIT                                                         MET01100
C***CHECK YEAR.                                                         MET01110
10    IF (IYEAR.EQ.IYRC) GO TO 20                                       MET01120
      WRITE (IO,470) IYEAR,IYRC,IREC                                    MET01130
      WRITE (IO,510)                                                    MET01140
      CALL EXIT                                                         MET01150
C***CHECK MONTH                                                         MET01160
20    IF (IMONTH.EQ.IMO) GO TO 40                                       MET01170
      IF (IMONTH.EQ.(IMO+1)) GO TO 30                                   MET01180
      WRITE (IO,480) IMONTH,IMO,IREC                                    MET01190
C***                                                                    MET01200
      WRITE (IO,510)                                                    MET01210
      CALL EXIT                                                         MET01220
30    IMO=IMONTH                                                        MET01230
C***CHECK DAY                                                           MET01240
40    IF (IFIX(DAY1).EQ.IDY) GO TO 50                                   MET01250
      WRITE (IO,490) DAY1,IDY,IREC                                      MET01260
      WRITE (IO,510)                                                    MET01270
      CALL EXIT                                                         MET01280
C***CHECK HOUR                                                          MET01290
50    IF (IHOUR.EQ.KHRC) GO TO 80                                       MET01300
      WRITE (IO,500) IHOUR,KHR,IREC                                     MET01310
      WRITE (IO,510)                                                    MET01320
      GO TO 370                                                         MET01330
60    WRITE (IO,520) KHR,IREC,IHOUR                                     MET01340
      CALL EXIT                                                         MET01350
70    IF (IHOUR.NE.0) GO TO 60                                          MET01360
      KHRC=IHOUR                                                        MET01370
C***UPDATE MIXING HEIGHTS- STARTING NEW DAY.                            MET01380
      XMNM1=XMN                                                         MET01390
      XAFM1=XAF                                                         MET01400
      XMN=XMNP1                                                         MET01410
      XAF=XAFP1                                                         MET01420
C***READ NEXT DAYS MIXING HEIGHTS.                                      MET01430
      READ (IN,430,END=80) XMNP1,XAFP1                                  MET01440
80    DO 90 JK=1,11                                                     MET01450
      IF (ICOVER.EQ.IDIG(JK)) GO TO 100                                 MET01460
 90   CONTINUE                                                          MET01470
      JK=11                                                             MET01480
      WRITE (IO,530) ICOVER                                             MET01490
100   ISKY=JK-1                                                         MET01500
      IF (ICEIL(1).NE.IDIG(11)) GO TO 110                               MET01510
      IDG(1)=9                                                          MET01520
      IDG(2)=9                                                          METO1530
      IDG(3)=8                                                          METO1540
      GO TO 150                                                         METO1550
  110 DO 140 JI=1,3                                                     METO1560
      DO 120 JK=1,10                                                    METO1570
      IF (ICEIL(JI).EQ.IDIG(JK)) GO TO 130                              METO1580
  120 CONTINUE                                                          METO1590
  130 IDG(JI)=JK-1                                                      METO1600
  140 CONTINUE                                                          METO1610
  150 IROOF=IDG(1)*100+IDG(2)*10+IDG(3)                                 METO1620
C***IROOF IS CEILING HEIGHT IN HUNDREDS OF FEET.                         METO1630
C***CONVERT TEMP FROM FAHRENHEIT TO KELVIN                              METO1640
      TEMP(KHR)=0.5556*(ITEMP-32.)+273.15                               METO1650
C***CONVERT WIND SPEED FROM KNOTS TO METERS/SEC                          METO1660
      S=ISPEED*0.51444                                                  METO1670
C***WIND SPEED IS SET TO 1 METER/SEC                                    METO1680
      IF (S.LT.1.0) S=1.0                                               METO1690
      SPEED(KHR)=S                                                      METO1700
C***CHECK FOR CALMS                                                     METO1710
      IF (IDIR.EQ.0) GO TO 160                                          METO1720
C***WIND DIRECTION IS ASSUMED TO BE THE SAME AS FOR THE LAST HOUR       METO1730
C***IF THE WIND DIRECTION IS REPORTED AS "CALM".                        METO1740
      LWD=IDIR                                                          METO1750
      GO TO 170                                                         METO1760
  160 IDIR=LWD                                                          METO1770
  170 XDIR=IDIR*10.                                                     METO1780
C***CALCULATE FLOW VECTOR AND RANDOM FLOW VECTOR                        METO1790
      IF (XDIR.GT.180.) GO TO 180                                       METO1800
      FV=XDIR+180.                                                      METO1810
      GO TO 190                                                         METO1820
  180 FV=XDIR-180.                                                      METO1830
  190 AFV(KHR)=FV                                                       METO1840
      IRAND=RAND(KHR)*10.                                               METO1850
C***IRAND IS SINGLE DIGIT FROM 0 TO 9.                                  METO1860
      FVR(KHR)=FV+IRAND-4.0                                             METO1870
      IF (FVR(KHR).GT.360.) FVR(KHR)=FVR(KHR)-360.                      METO1880
C***DETERMINE RADIATION INDEX.                                          METO1890
      IF (ISKY.EQ.10.AND.IROOF.LT.70) GO TO 200                         METO1900
      IF (IHOUR.GT.TSR.AND.IHOUR.LT.TSS) GO TO 210                      MET01910
      IRADX=2                                                           MET01920
      IF (ISKY.LE.4) IRADX=1                                            MET01930
      GO TO 280                                                         MET01940
200   IRADX=3                                                           MET01950
      GO TO 280                                                         MET01960
C***DETERMINE THE ANGLE OF ELEVATION                                    MET01970
C***DETERMINE SOLAR HOUR ANGLE(RADIANS)                                 MET01980
210   HI=(15.*(KHRC-AMM)+TEMPZ)/CONST                                   MET01990
      ALFSN=SIHLAT*DSIN+DCOS*COSLAT*COS(HI)                             MET02000
C***DETERMINE SOLAR ELEVATION ANGLE(DEG).                               MET02010
      ALF=ATAN2(ALFSN,SQRT(1.-ALFSN*ALFSN))*CONST                       MET02020
      DO 220 I=1,3                                                      MET02030
      IF (ALF.GT.ANGL(I)) GO TO 230                                     MET02040
220   CONTINUE                                                          MET02041
      I=4                                                               MET02050
230   ICN=5-I                                                           MET02060
      IF (ISKY.GT.5) GO TO 240                                          MET02070
      IRADX=ICN+3                                                       MET02080
      GO TO 280                                                         MET02090
240   IRADX=ICN-1                                                       MET02100
      IF (IROOF.LT.70) GO TO 250                                        MET02110
      IF (IROOF.LT.160) GO TO 260                                       MET02120
      IF (ISKY.EQ.10) GO TO 270                                         MET02130
      IRADX=ICN                                                         MET02140
      GO TO 270                                                         MET02150
250   IRADX=ICN-2                                                       MET02160
      GO TO 270                                                         MET02170
260   IF (ISKY.EQ.10) IRADX=IRADX-1                                     MET02180
270   IF (IRADX.LT.1) IRADX=1                                           MET02190
      IRADX=IRADX+3                                                     MET02200
280   IND=ISPEED                                                        MET02210
      IF (ISPEED.GT.12) IND=12                                          MET02220
      IF (ISPEED.LE.1) IND=1                                            MET02230
C***DETERMINE STABILITY.                                                MET02240
      KST(KHR)=LSTAB(IND,IRADX)                                         MET02250
C***DO NOT ALLOW STABILITY TO VARY RAPIDLY                              MET02260
      IF (IDY.EQ.1.AND.KHR.EQ.1) LST=KST(KHR)                           MET02270
      IF ((KST(KHR)-LST).GT.1) KST(KHR)=LST+1                            MET02280
      IF ((LST-KST(KHR)).GT.1) KST(KHR)=LST-1                            MET02290
      LST=KST(KHR)                                                       MET02300
      IF (KST(KHR).LT.1) WRITE (IO,540) KST(KHR),IND,IRADX,IREC          MET02310
C***CALCULATE MIXING HEIGHT                                               MET02320
      IHR=KHRC                                                           MET02330
      XHR=IHR                                                            MET02340
      IF (IHR.GT.14.AND.XHR.LE.TSS) GO TO 300                            MET02350
      IND=2                                                              MET02360
      IF (XHR.LE.TSS) GO TO 310                                          MET02370
      IF (KST(KHR).EQ.4) GO TO 290                                       MET02380
      HLH(2,KHR)=XAF+(XMNP1-XAF)*((XHR-TSS)/(24.-TSS))                   MET02390
      IND=1                                                              MET02400
290   HLH(IND,KHR)=XAF+(XAFP1-XAF)*((XHR-TSS)/(38.-TSS))                 MET02410
      IF (IND.EQ.2) HLH(1,KHR)=HLH(2,KHR)                                MET02420
      GO TO 360                                                          MET02430
300   HLH(1,KHR)=XAF                                                     MET02440
      HLH(2,KHR)=XAF                                                     MET02450
      GO TO 360                                                          MET02460
310   IF (XHR.GT.TSR) GO TO 330                                          MET02470
      KSTSP=KST(KHR)                                                     MET02480
      IF (KST(KHR).EQ.4) GO TO 320                                       MET02490
      HLH(2,KHR)=XMN                                                     MET02500
      IND=1                                                              MET02510
320   HLH(IND,KHR)=XAFM1+(XAF-XAFM1)*((24.-TSS+XHR)/(24.-TSS+14.))       MET02520
      IF (IND.EQ.2) HLH(1,KHR)=HLH(2,KHR)                                MET02530
      GO TO 360                                                          MET02540
330   IF (KSTSP.EQ.4) GO TO 350                                          MET02550
      HLH(2,KHR)=XMN+(XAF-XMN)*((XHR-TSR)/(14.-TSR))                     MET02560
      HLH(1,KHR)=XAF*(XHR-TSR)/(14.-TSR)                                 MET02570
      GO TO 360                                                          MET02580
340   IFLAG=1                                                            MET02590
      IHOUR=0                                                            MET02600
      GO TO 370                                                          MET02610
350   HLH(1,KHR)=XAFM1+(XAF-XAFM1)*((24.-TSS+XHR)/(24.-TSS+14.))         MET02620
      HLH(2,KHR)=HLH(1,KHR)                                              MET02630
C***READ NEXT HOUR"S MET DATA                                             MET02640
360   IF (IFLAG.EQ.1) GO TO 390                                          MET02650
```

```
C***STORE CORRECT MONTH AND DAY FOR DAILY PRINTOUT, SINCE 24TH HOUR LABEMET02660
      IF(KHR.NE.23) GO TO 365                                           MET02670
      LMON=IMONTH                                                       MET02680
      LDAY=IDAY                                                         MET02690
365   READ (8,420,END=340) ID,IYEAR,IMONTH,IDAY,IHOUR,ICEIL,IDIR,ISPEED,MET02700
     1ITEMP,ICOVER                                                      
      IREC=IREC+1                                                       MET02710
C***END OF HOUR LOOP.                                                   MET02720
370   CONTINUE                                                          MET02730
C***WRITE DAYS CALCULATION ON TO FILE                                   MET02740
C***EACH ARRAY CONTAINS THE COMPLETE INFORMATION FOR ONE DAY ORDERED    MET02750
C***SEQUENTIALLY FROM HOUR 01 THRU 24                                   MET02760
      WRITE (9) IYEAR,LMON,DAY1,KST,SPEED,TEMP,AFV,FVR,HLH              MET02770
      WRITE (IO,550) IYEAR,LMON,LDAY,DAY1,TSR,TSS                       MET02780
      WRITE (IO,560) KST                                                MET02790
      WRITE (IO,570) SPEED,TEMP,AFV,FVR,((HLH(I,J),J=1,24),I=1,2)       MET02800
C***END OF DAY LOOP.                                                    MET02810
380   CONTINUE                                                          MET02820
390   WRITE (9) IYEAR,LMON,DAY1,KST,SPEED,TEMP,AFV,FVR,HLH              MET02830
      WRITE (IO,550) IYEAR,LMON,LDAY,DAY1,TSR,TSS                       MET02840
      WRITE (IO,560) KST                                                MET02850
      WRITE (IO,570) SPEED,TEMP,AFV,FVR,((HLH(I,J),J=1,24),I=1,2)       MET02860
      WRITE (IO,580)                                                    MET02870
      CALL EXIT                                                         MET02880
C                                                                       MET02890
400   FORMAT (I5,I2,1X,2F10.1,F2.0,I4,F10.0)                            MET02900
410   FORMAT(" STATION NUMBER=",I5,5X,"YEAR OF DATA=",I2/1X,            MET02910
     *"LATITUDE=",F10.1,"  LONGITUDE=",F10.1,"  ZONE=",F4.0/1X,         MET02920
     *"NUMBER OF DAYS IN YEAR=",I3,"  RANDOM SEED=",F10.0)              MET02930
420   FORMAT (I5,4I2,3A1,22X,2I2,4X,I3,29X,A1)                          MET02940
430   FORMAT (12X,F5.0,13X,F5.0)                                        MET02950
440   FORMAT (I5,I2,5X,F5.0,13X,F5.0)                                   MET02960
450   FORMAT (1X,"19",I2," SURFACE DATA AT STATION ",I5,10X,"19",I2," MIMET02970
     1XING HEIGHT DATA AT STATION ",I5)                                 MET02980
460   FORMAT (" ID DOES NOT MATCH IN RECORD # ",I4,"  ID ON TAPE IS ",I5MET02990
     *," ID REQUESTED IS ",I5)                                          MET03000
470   FORMAT (" YEAR IS",I3," INSTEAD OF ",I2," IREC=",I4)              MET03010
480   FORMAT (" MONTH ",I2," DOES NOT AGREE WITH LOOP ",I2," IREC=",I4) MET03020
```

```
  490  FORMAT (" DAY ",F4.0," DOES NOT AGREE WITH LOOP ",I2," IREC=",I4) MET03040
  500  FORMAT (" HOUR ",I2," DOES NOT AGREE WITH LOOP ",I2," IREC=",I4)  MET03050
  510  FORMAT (" *****DATA IS MISSING. PLEASE CORRECT INPUT FILE*****")  MET03060
  520  FORMAT (" ERROR: MISSING HOUR LOOP VALUE= ",I3," WHILE VALUE ","ONMET03070
      1 RECORD ",I7," IS = ",I3)                                        MET03080
  530  FORMAT (" THE CHARACTER ",A1," IS NOT ALLOWABLE."," CLOUD COVER DEMET03090
      1FAULTS TO 10.")                                                  MET03100
  540  FORMAT (" STABILITY=",4I4)                                       MET03110
  550  FORMAT (" IYEAR=",I2," IMONTH=",I2," DAY=",I2," JULIAN DAY=",    MET03120
      *F5.0," SUNRISE=",F7.3,"  SUNSET=",F7.3)                          MET03130
  560  FORMAT (" KST= ",24(I1,4X))                                      MET03140
  570  FORMAT (" SPEED=  ",24(F4.1,1X)/" TEMP=",24(F4.0,1X)/" AFV= ",24(FMET03150
      14.0,1X)/" FVR=",24(F4.0,1X)/" HLH1=",12(F5.0,1X)/6X,12(F5.0,1X)/" MET03160
      2HLH2=",12(F5.0,1X)/6X,12(F5.0,1X))                               MET03170
  580  FORMAT (" ALL RECORDS HAVE BEEN PROCESSED")                      MET03180
C                                                                       MET03190
       END                                                              MET03200
```

APPENDIX H

LOGIC FLOW DESCRIPTION OF THE ISC SHORT-TERM MODEL (ISCST) COMPUTER PROGRAM

The ISCST program is composed of a main program (ISCST), nine subroutines (INCHK, MODEL, DYOUT, MAXOT, MAX50, VERT, SIGMAZ, UPWIND and ERFX) and a BLOCK DATA subprogram (BLOCK). The source codes for all of these routines is listed in Appendix A.

The main routine (ISCST) of the program is responsible for clearing (setting all values to zero) all data storage, reading the necessary input parameters in order to compute the required data storage* for a problem run and printing an error message if the computed data storage exceeds the allocated data storage. Assuming that no error is found in computing the required data storage, this routine calls subroutine INCHK which reads the remaining input parameters (except for the hourly meteorological data), provides program default values when necessary and prints all input parameters when desired by the user. Finally, the main routine, upon a return from subroutine INCHK, calls subroutine MODEL which reads the hourly meteorological data, performs all concentration or deposition calculations and controls all output. A successful return from subroutine MODEL allows the main program to normally terminate the run. Figure H-1 is a flow diagram of the ISCST main program routine.

Subroutine INCHK reads receptor location data, source group data, meteorological-related constants data, identification labels, model constants, and source data Default values are provided by the program for all input parameters when necessary. This subroutine will print error messages and terminate the run when the number of sources to be processed equals zero and when either the values of the surface or upper air station number and years specified by the user do not match the corresponding information read from the hourly meteorological data tape. This subroutine will

---

*Consult Section 3.2.3.a for a discussion of required data storage computations.

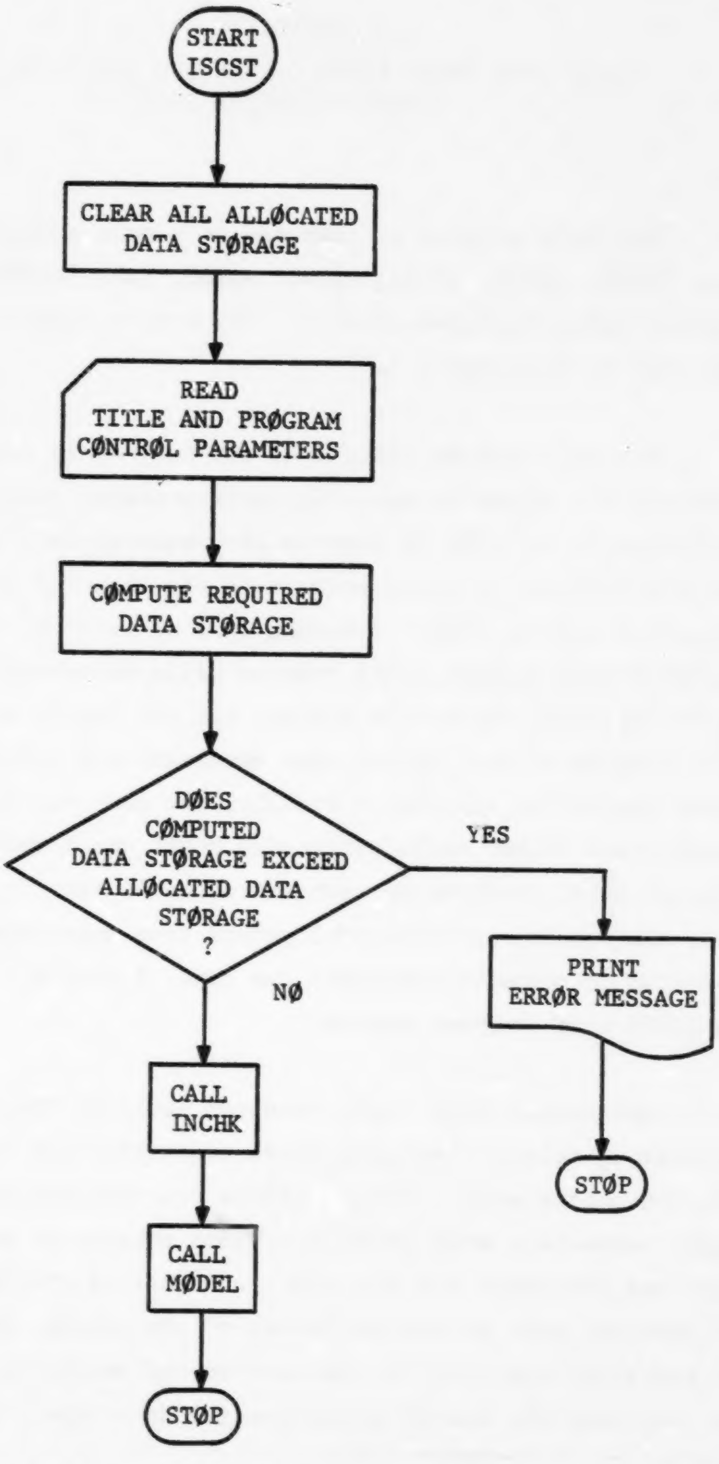

START ISCST
CLEAR ALL ALLØCATED DATA STØRAGE
READ TITLE AND PRØGRAM CØNTRØL PARAMETERS
CØMPUTE REQUIRED DATA STØRAGE
DØES CØMPUTED DATA STØRAGE EXCEED ALLØCATED DATA STØRAGE ?
YES
NØ
PRINT ERRØR MESSAGE
STØP
CALL INCHK
CALL MØDEL
STØP

FIGURE H-1. ISCST Routine Flow Diagram.

then print all input data parameters if desired by the user. The INCHK subroutine then returns to the calling routine (ISCST) provided no errors were detected. Figure H-2 is a flow diagram of the INCHK subroutine.

Subroutine MODEL is the principal section of the ISCST program. Its main functions are reading the hourly meteorological data, performing all concentration or deposition calculations and controlling the output related to calculated concentration or deposition values. Figure H-3 is a flow diagram of the MODEL subroutine. First, the subroutine computes vertical (x_z) and lateral (x_y) virtual distances for all source, stability category and downwind distance combinations. Next, the subroutine searches for all source-receptor distances less than 100 meters or the greater of three building heights or three building widths. A diagnostic table identifying the aforementioned source-receptor combinations is printed if any combinations are found. The subroutine then begins a loop over all days of meteorological data and reads a day of data from either tape or card. A second loop is begun over the hours of meteorological data followed by a third loop over all sources. For stack-type sources, all plume rise calculations are made that are independent of source-receptor orientation. Next, a loop over all receptors is begun. In this portion of the subroutine, all information has been collected in order to calculate the terms used to make a concentration or deposition computation at a given receptor from a given source for an hour of meteorological data. The program first computes the downwind (x) and crosswind (y) distances. Subroutine UPWIND is called to check if receptors, referenced by the polar coordinate system, are upwind of the given source location. For stack-type sources, the subroutine then completes the remaining plume rise calculations if they are dependent on source-receptor orientation. Next, the subroutine calculates the vertical (σ_z) and horizontal (σ_y) dispersion coefficients as a function of downwind distance and stability category. Subroutine SIGMAZ may be called to compute σ_z; this depends on the given meteorology, source and receptor data. Finally, concentration or deposition is calculated for this source-receptor combination for a given hour of meteorological data. Subroutine ERFX is called to compute the error function values for area-type

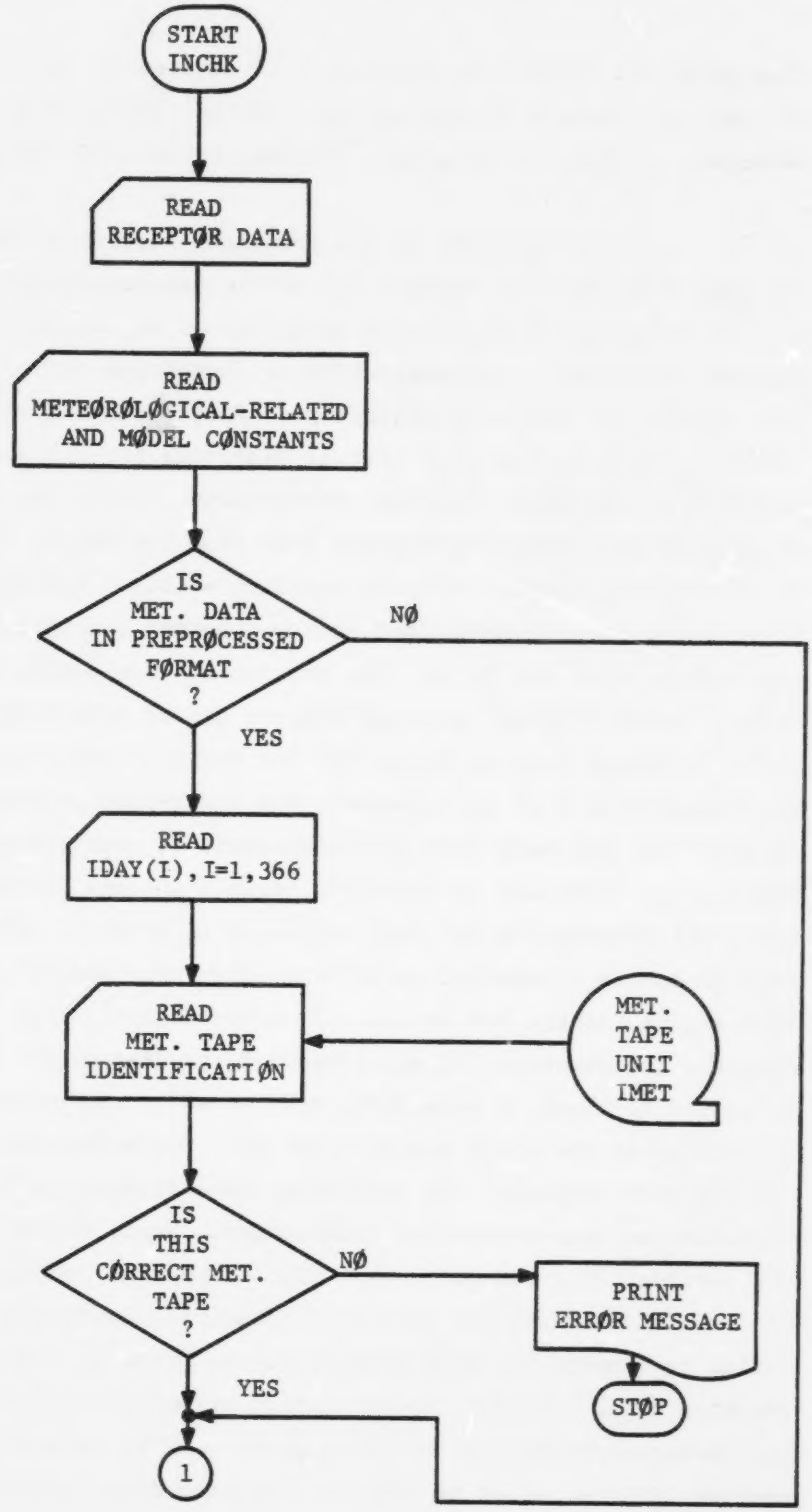

START INCHK
READ RECEPTOR DATA
READ METEOROLOGICAL-RELATED AND MODEL CONSTANTS
IS MET. DATA IN PREPROCESSED FORMAT ?
NO
YES
READ IDAY(I), I=1,366
READ MET. TAPE IDENTIFICATION
MET. TAPE UNIT IMET
IS THIS CORRECT MET. TAPE ?
NO
PRINT ERROR MESSAGE
STOP
YES
1

FIGURE H-2. INCHK Subroutine Flow Diagram.

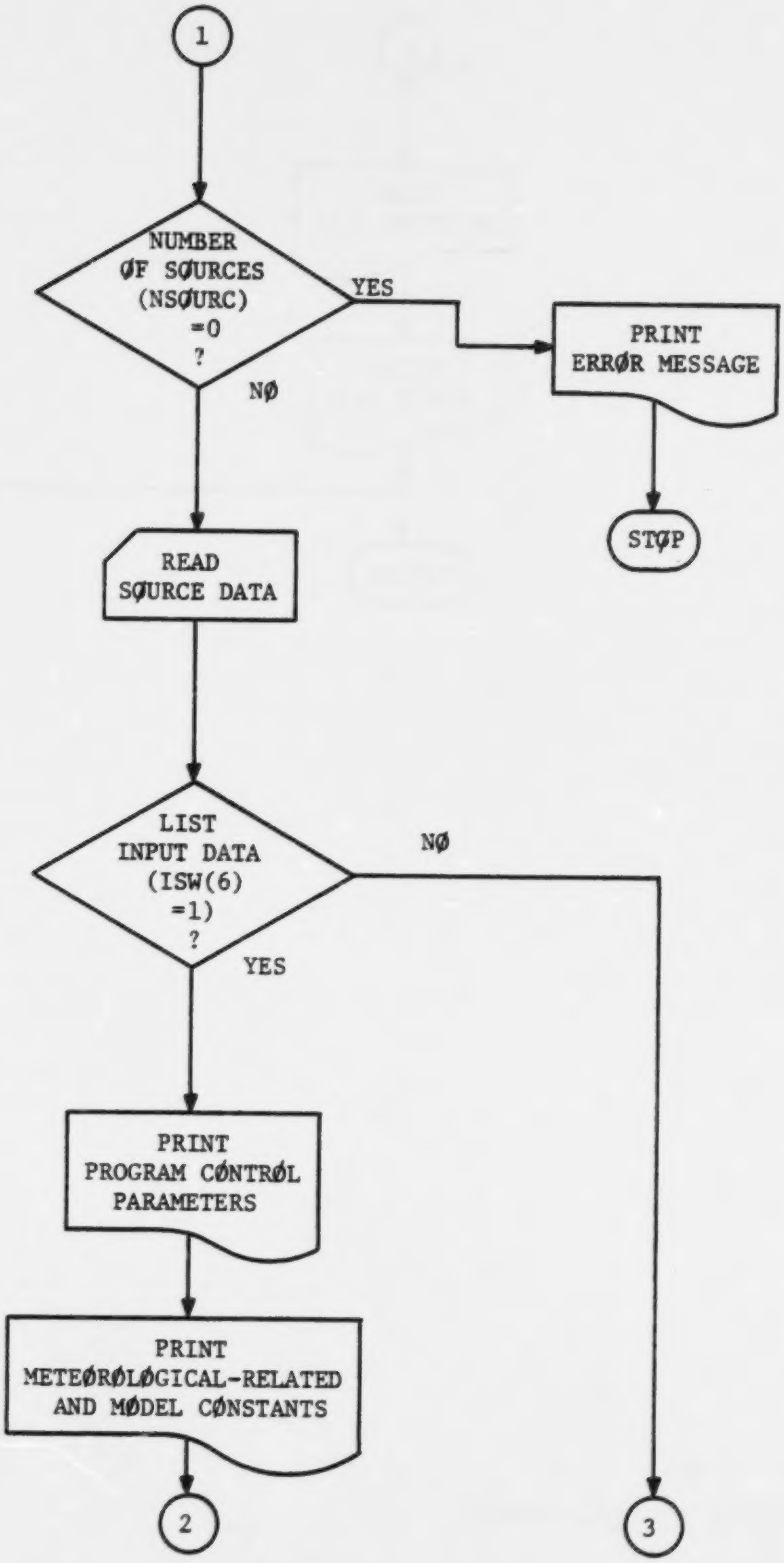

1
NUMBER
ØF SØURCES
(NSØURC)
=0
?
YES
NØ
PRINT
ERRØR MESSAGE
STØP
READ
SØURCE DATA
LIST
INPUT DATA
(ISW(6)
=1)
?
NØ
YES
PRINT
PROGRAM CØNTRØL
PARAMETERS
PRINT
METEØRØLØGICAL-RELATED
AND MØDEL CØNSTANTS
2
3

FIGURE H-2. (Continued)

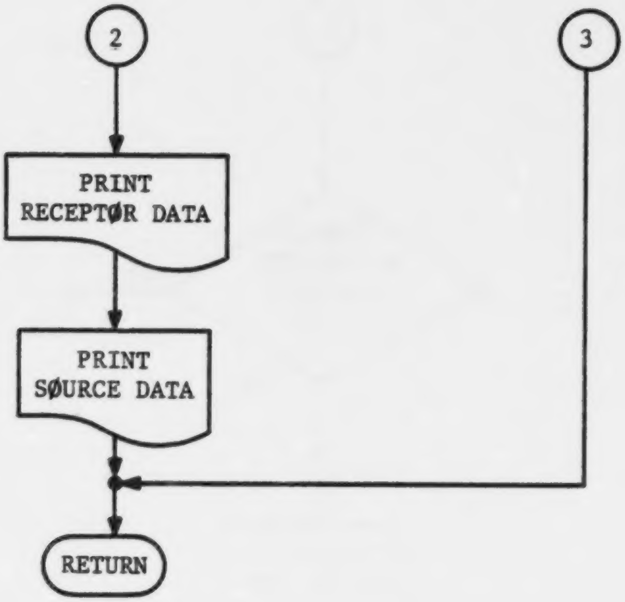

2
3
PRINT
RECEPTØR DATA
PRINT
SØURCE DATA
RETURN

FIGURE H-2. (Continued)

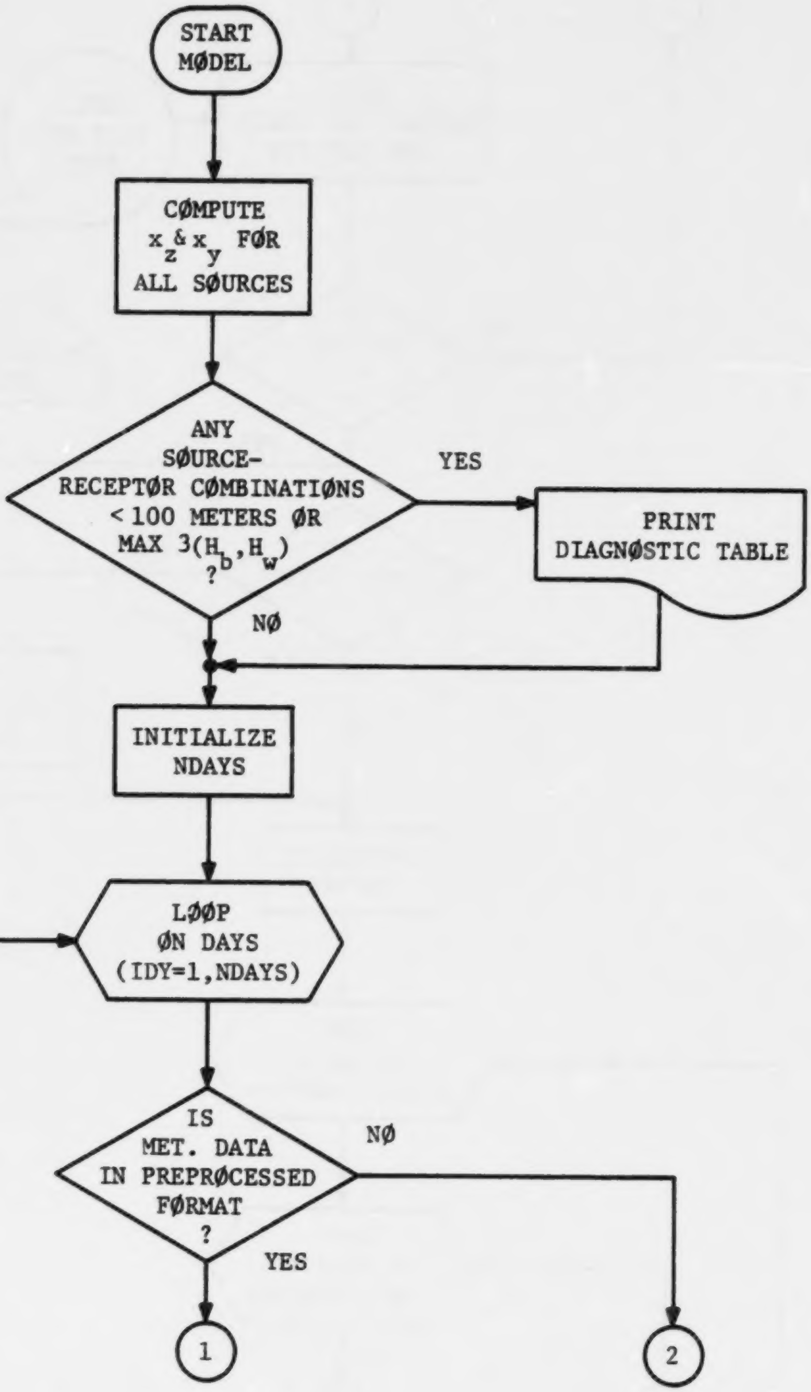

START MØDEL
CØMPUTE x_z & x_y FØR ALL SØURCES
ANY SØURCE-RECEPTØR CØMBINATIØNS < 100 METERS ØR MAX 3(H_b, H_w) ?
YES
PRINT DIAGNØSTIC TABLE
NØ
INITIALIZE NDAYS
LØØP ØN DAYS (IDY=1,NDAYS)
IS MET. DATA IN PREPRØCESSED FØRMAT ?
NØ
YES
3
1
2

FIGURE H-3. MODEL Subroutine Flow Diagram.

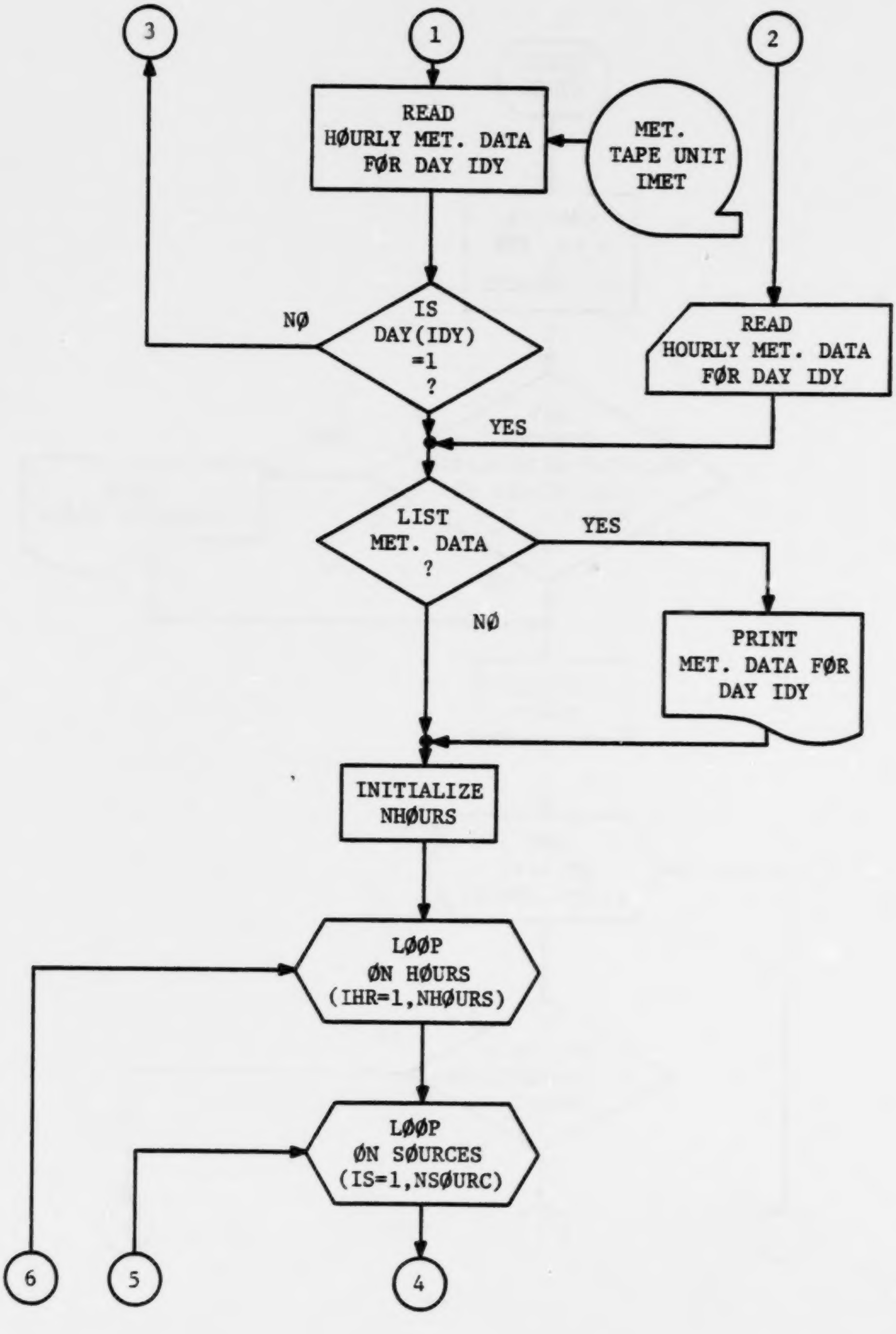

3
1
2
READ HØURLY MET. DATA FØR DAY IDY
MET. TAPE UNIT IMET
IS DAY(IDY) =1 ?
NØ
READ HOURLY MET. DATA FØR DAY IDY
YES
LIST MET. DATA ?
YES
NØ
PRINT MET. DATA FØR DAY IDY
INITIALIZE NHØURS
LØØP ØN HØURS (IHR=1,NHØURS)
LØØP ØN SØURCES (IS=1,NSØURC)
6
5
4

FIGURE H-3. (Continued)

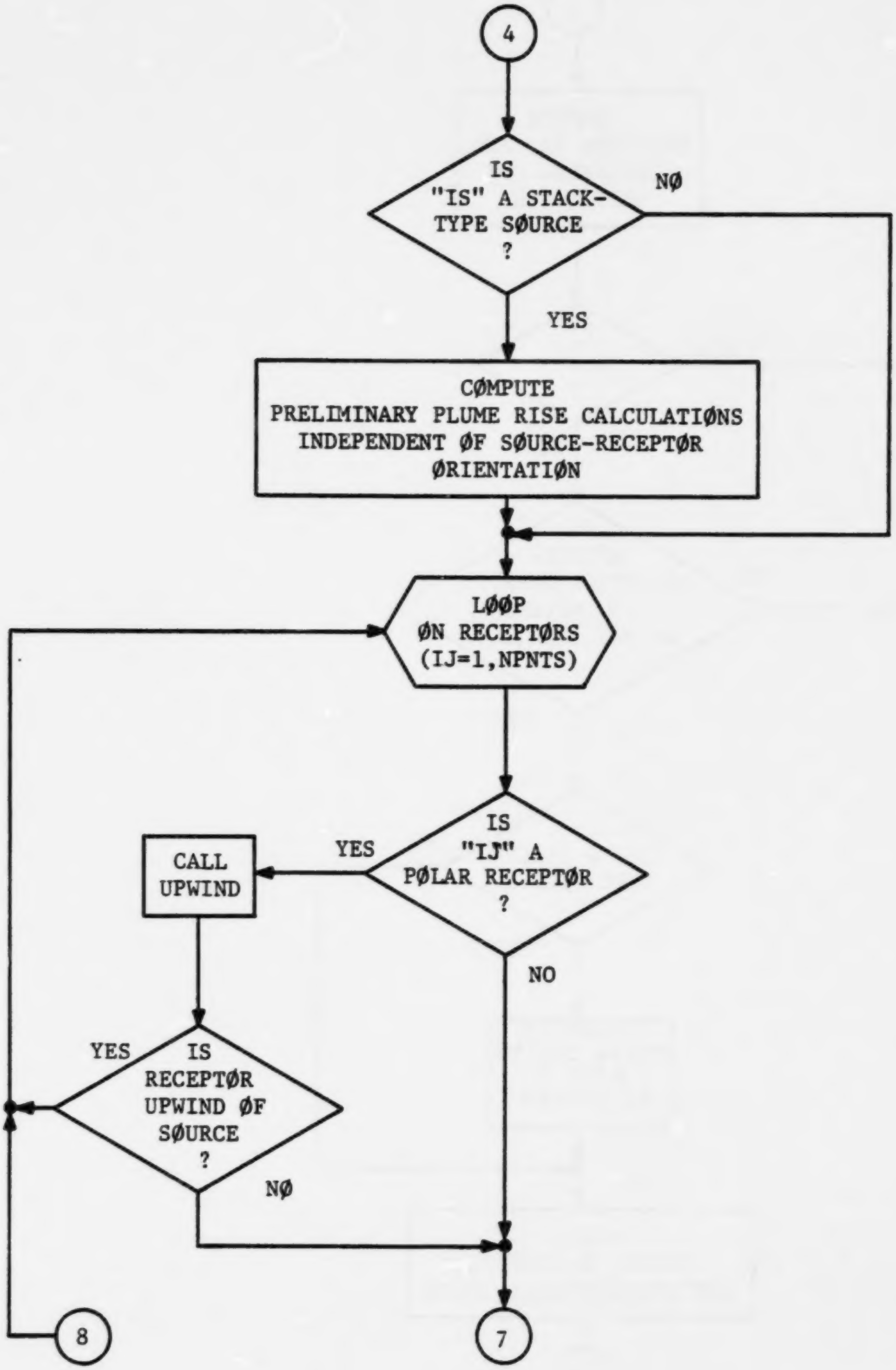

4
IS "IS" A STACK-TYPE SOURCE ?
NO
YES
COMPUTE PRELIMINARY PLUME RISE CALCULATIONS INDEPENDENT OF SOURCE-RECEPTOR ORIENTATION
LOOP ON RECEPTORS (IJ=1,NPNTS)
IS "IJ" A POLAR RECEPTOR ?
YES
CALL UPWIND
NO
YES
IS RECEPTOR UPWIND OF SOURCE ?
NO
8
7

FIGURE H-3. (Continued)

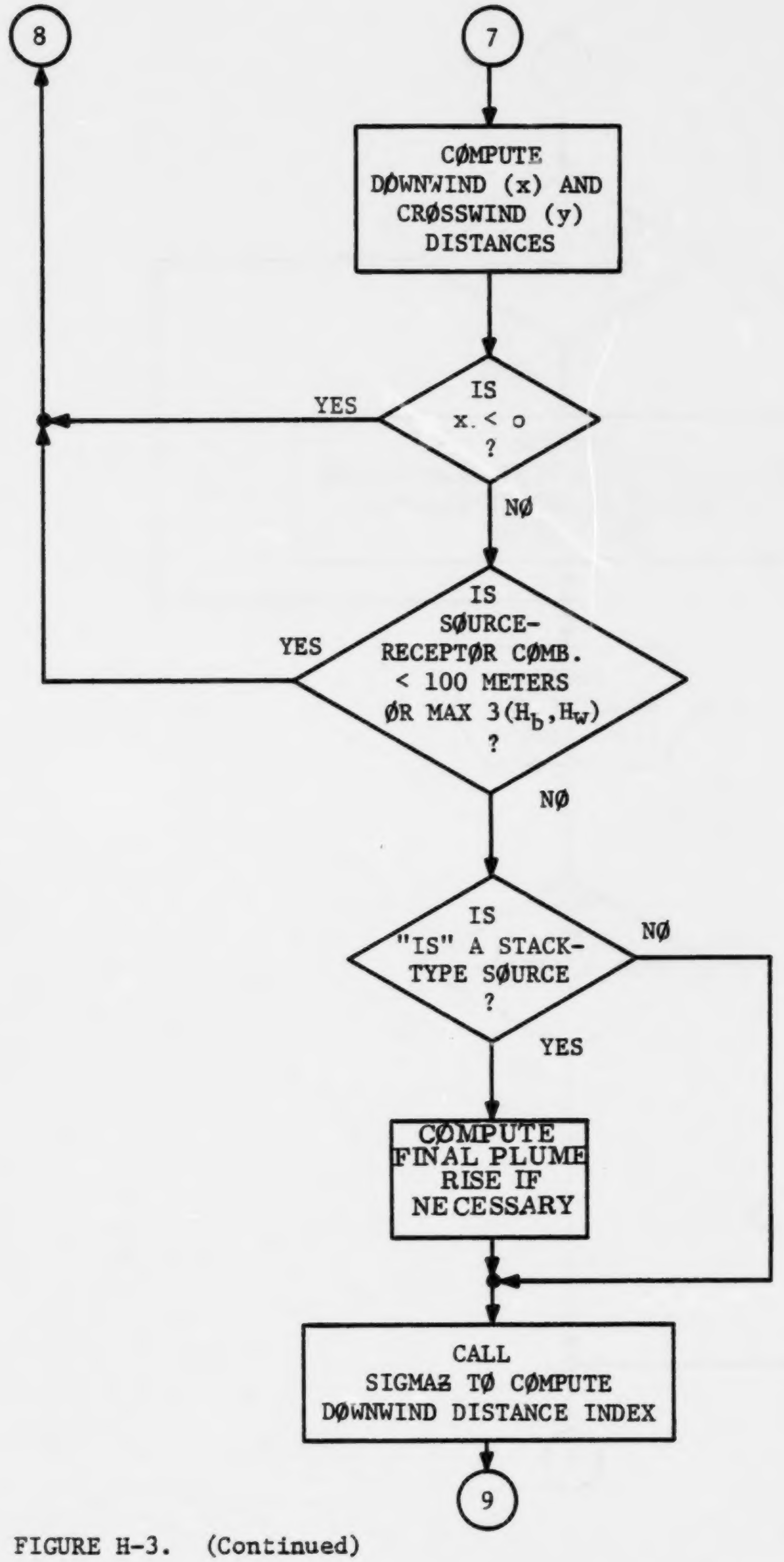

8
7
CØMPUTE DØWNWIND (x) AND CRØSSWIND (y) DISTANCES
IS x < o ?
YES
NØ
IS SØURCE-RECEPTØR CØMB. < 100 METERS ØR MAX 3(H_b,H_w) ?
YES
NØ
IS "IS" A STACK-TYPE SØURCE ?
NØ
YES
CØMPUTE FINAL PLUME RISE IF NECESSARY
CALL SIGMAZ TØ CØMPUTE DØWNWIND DISTANCE INDEX
9

FIGURE H-3. (Continued)

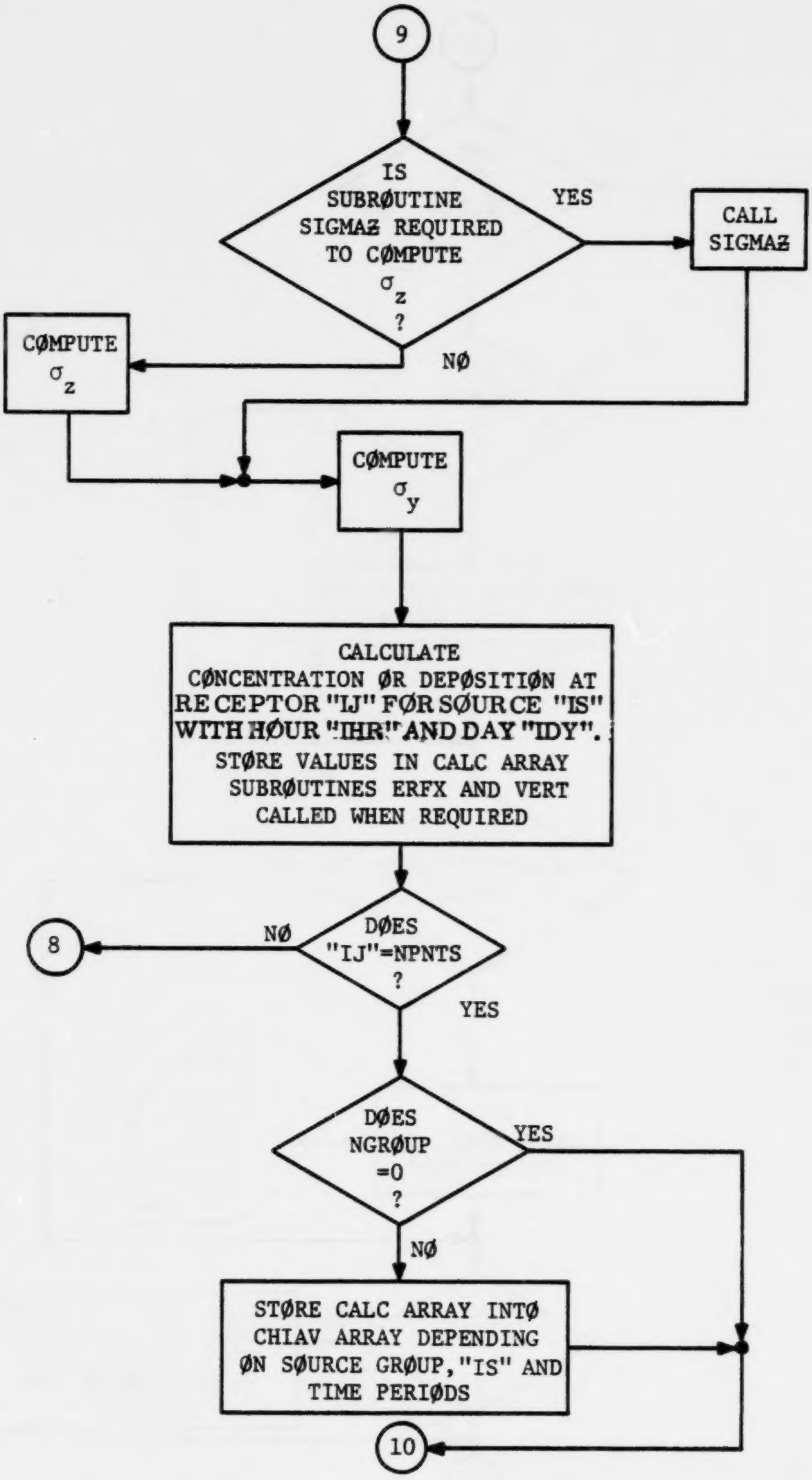

9
IS SUBROUTINE SIGMAZ REQUIRED TO COMPUTE σ_z ?
YES
CALL SIGMAZ
NO
COMPUTE σ_z
COMPUTE σ_y
CALCULATE CONCENTRATION OR DEPOSITION AT RECEPTOR "IJ" FOR SOURCE "IS" WITH HOUR "IHR" AND DAY "IDY". STORE VALUES IN CALC ARRAY SUBROUTINES ERFX AND VERT CALLED WHEN REQUIRED
DOES "IJ"=NPNTS ?
NO
8
YES
DOES NGROUP =0 ?
YES
NO
STORE CALC ARRAY INTO CHIAV ARRAY DEPENDING ON SOURCE GROUP, "IS" AND TIME PERIODS
10

FIGURE H-3. (Continued)

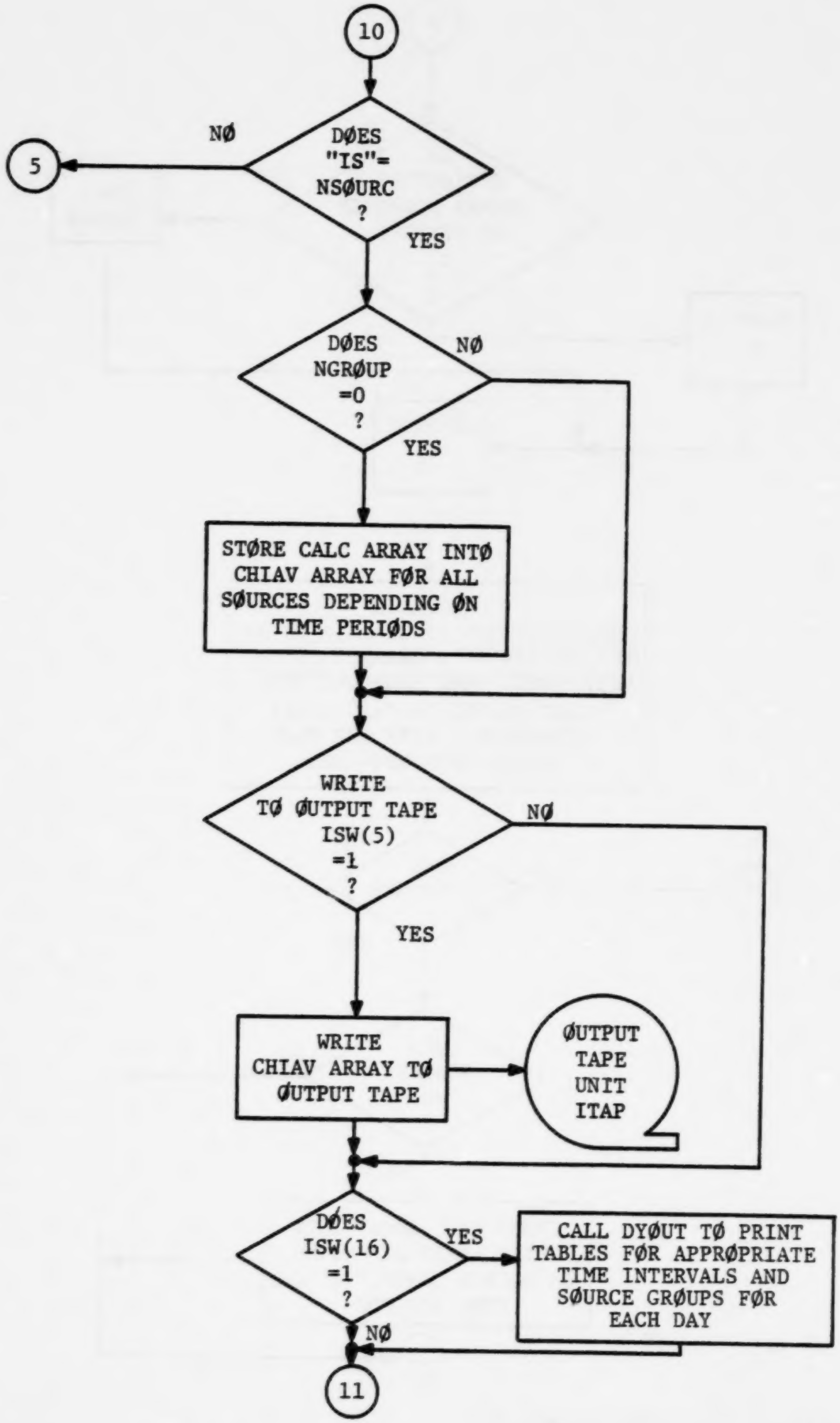

10
DØES "IS"= NSØURC ?
NØ
5
YES
DØES NGRØUP =0 ?
NØ
YES
STØRE CALC ARRAY INTØ CHIAV ARRAY FØR ALL SØURCES DEPENDING ØN TIME PERIØDS
WRITE TØ ØUTPUT TAPE ISW(5) =1 ?
NØ
YES
WRITE CHIAV ARRAY TØ ØUTPUT TAPE
ØUTPUT TAPE UNIT ITAP
DØES ISW(16) =1 ?
YES
CALL DYØUT TØ PRINT TABLES FØR APPRØPRIATE TIME INTERVALS AND SØURCE GRØUPS FØR EACH DAY
NØ
11

FIGURE H-3. (Continued)

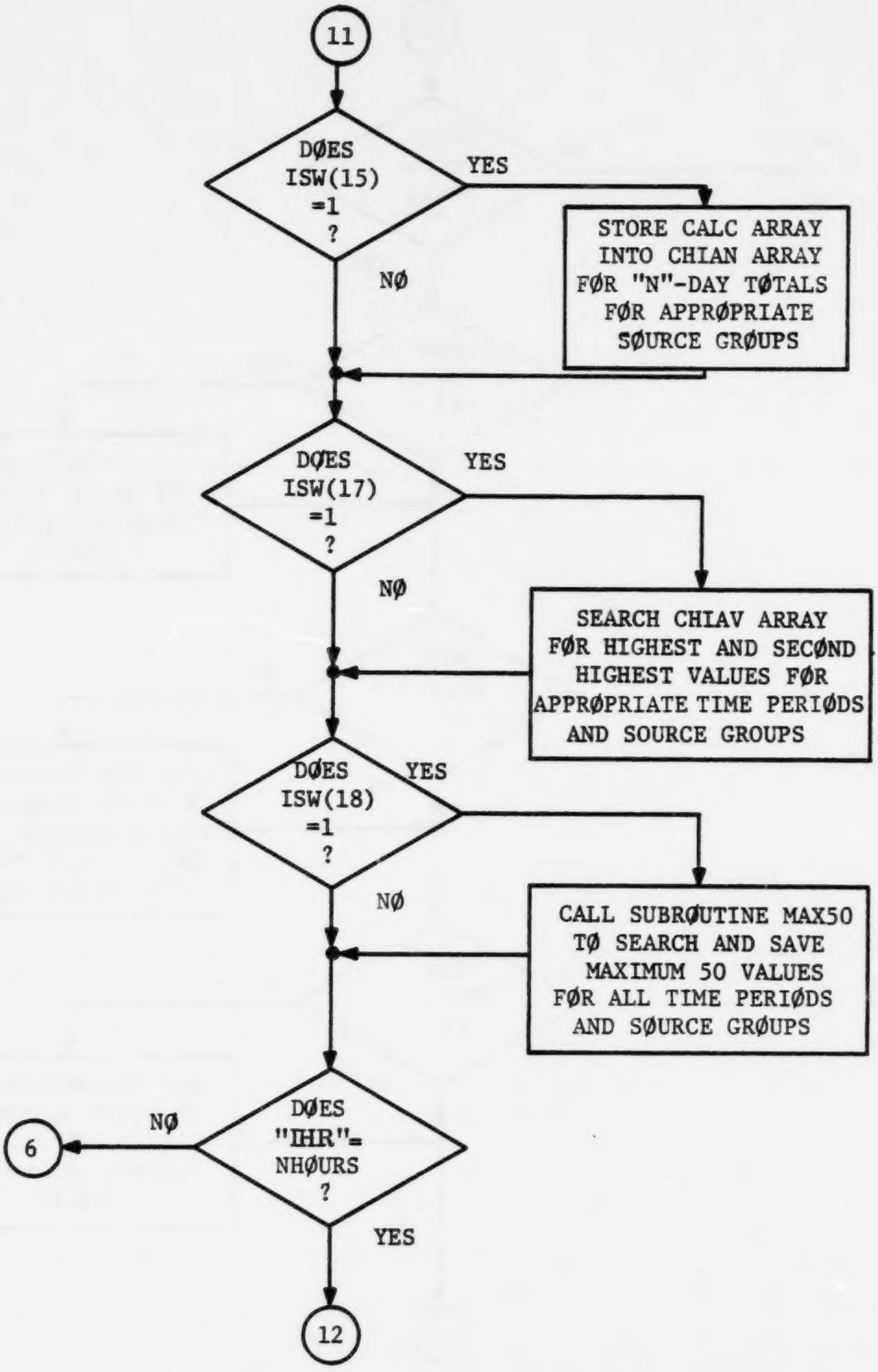

11
DØES ISW(15) =1 ?
YES
NØ
STORE CALC ARRAY INTO CHIAN ARRAY FØR "N"-DAY TØTALS FØR APPRØPRIATE SØURCE GRØUPS
DØES ISW(17) =1 ?
YES
NØ
SEARCH CHIAV ARRAY FØR HIGHEST AND SECØND HIGHEST VALUES FØR APPRØPRIATE TIME PERIØDS AND SOURCE GROUPS
DØES ISW(18) =1 ?
YES
NØ
CALL SUBRØUTINE MAX50 TØ SEARCH AND SAVE MAXIMUM 50 VALUES FØR ALL TIME PERIØDS AND SØURCE GRØUPS
DØES "IHR"= NHØURS ?
NØ
6
YES
12

FIGURE H-3. (Continued)

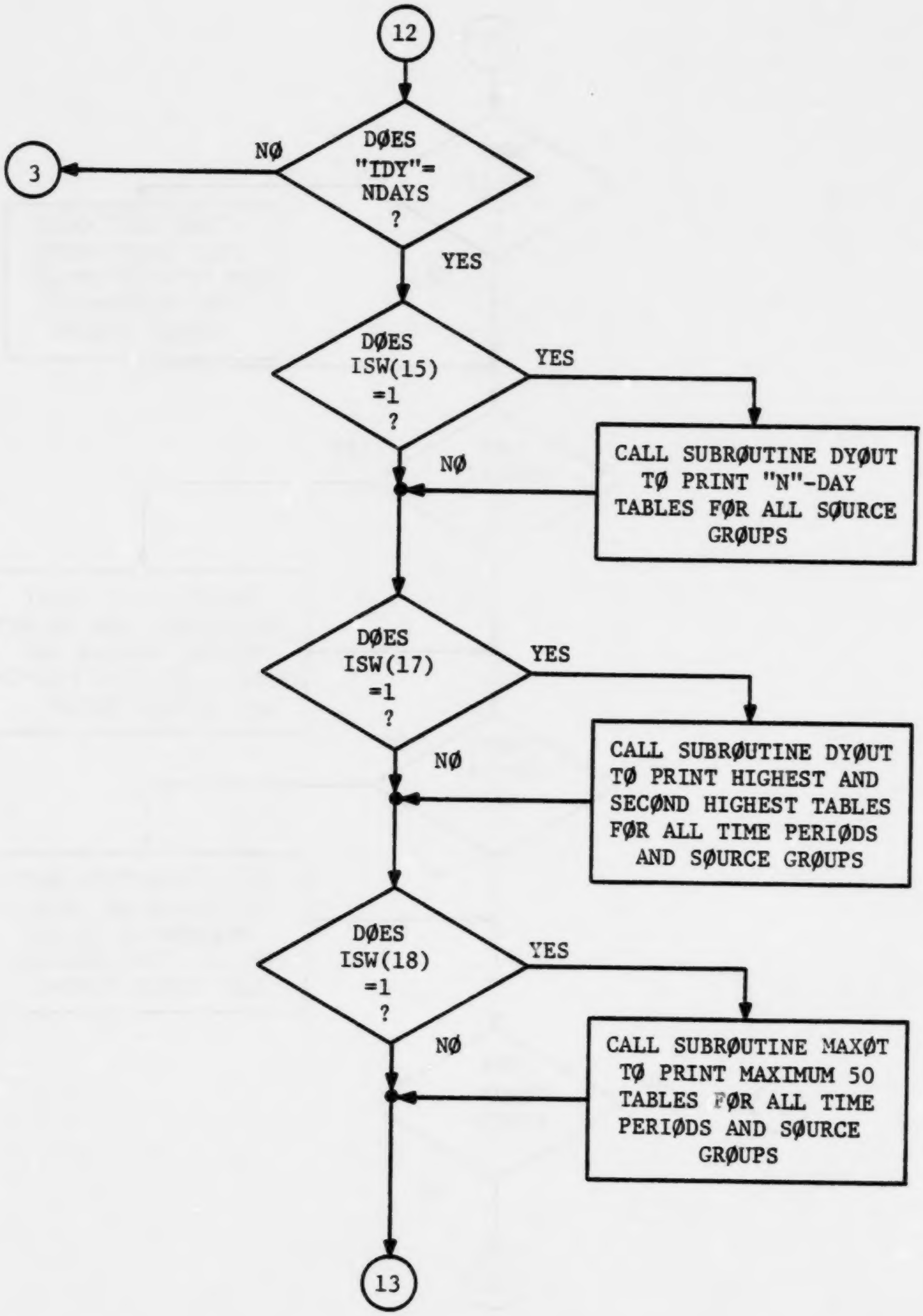

12
DOES "IDY"= NDAYS ?
NO
3
YES
DOES ISW(15) =1 ?
YES
CALL SUBROUTINE DYOUT TO PRINT "N"-DAY TABLES FOR ALL SOURCE GROUPS
NO
DOES ISW(17) =1 ?
YES
CALL SUBROUTINE DYOUT TO PRINT HIGHEST AND SECOND HIGHEST TABLES FOR ALL TIME PERIODS AND SOURCE GROUPS
NO
DOES ISW(18) =1 ?
YES
CALL SUBROUTINE MAXOT TO PRINT MAXIMUM 50 TABLES FOR ALL TIME PERIODS AND SOURCE GROUPS
NO
13

FIGURE H-3. (Continued)

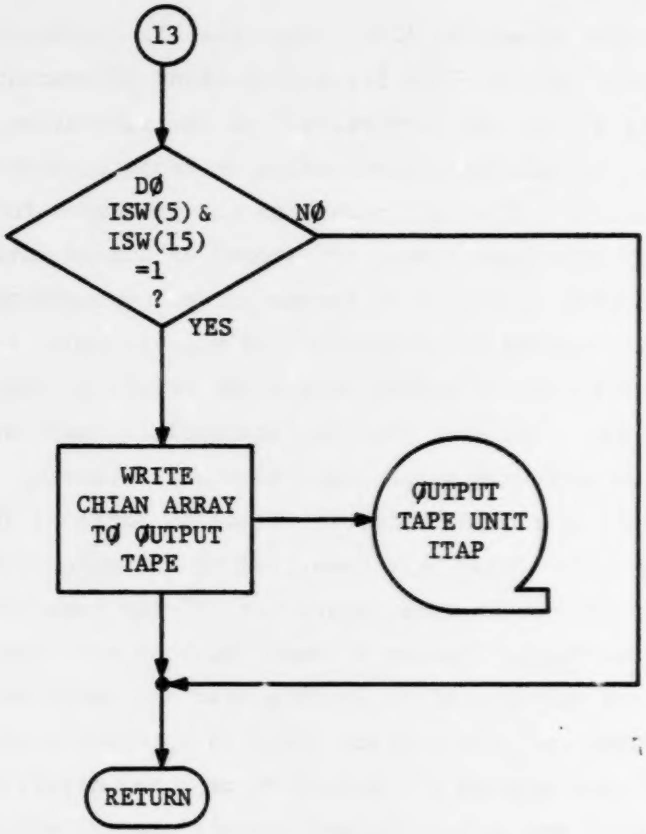

13
DØ ISW(5) & ISW(15) =1 ?
NØ
YES
WRITE CHIAN ARRAY TØ ØUTPUT TAPE
ØUTPUT TAPE UNIT ITAP
RETURN

FIGURE H-3. (Continued)

sources (see Equations (2-43) and (2-45)). Subroutine VERT aids in calculating the Vertical Term for calculations of concentration or deposition requiring a Vertical Term value. As the subroutine loops over all receptors, the calculated concentration or deposition values are stored into an array (CALC). After all receptors are processed for this source and hour, the array of values (CALC) are stored or summed into portions of another array (CHIAV) depending on source group combinations desired by the user. After all sources are processed for a given hour, portions of the CHIAV array are stored or summed into other arrays depending on the source group combination. For each hour and appropriate combination of user-defined time intervals, the subroutine calculates averages (for concentration) or sum totals (for deposition) of values in portions of the CHIAV array. Portions of array CHIAV are then used by the subroutine DYOUT to print tables, write to the output tape, store for "N"-day summations, search for highest and second-highest values at each receptor and search for the maximum 50 calculated values. After looping over all hours and days of meteorological data, MODEL calls subroutine DYOUT to optionally print tables or write to tape "N"-day average concentration or total deposition values and tables of the highest and second highest average concentration or total deposition. Subroutine MAXOT is called to optionally print tables of the maximum 50 average concentration or total deposition values. Upon normal processing of MODEL, a return is made to the ISCST routine.

Subroutine DYOUT prints out different types of tables related to all receptor points. Depending on a flag variable, subroutine DYOUT prints the terrain elevations for all receptors, the average concentration or total deposition values for all receptors for a given time interval and source group combination for a given day, and the highest or second-highest average concentration or total deposition values for all receptors for a given time interval and source group combination. Figure H-4 is a flow diagram of subroutine DYOUT.

The remaining subroutines which make up the ISCST program have the following functions. Subroutine MAXOT lists the maximum 50 average concentra-

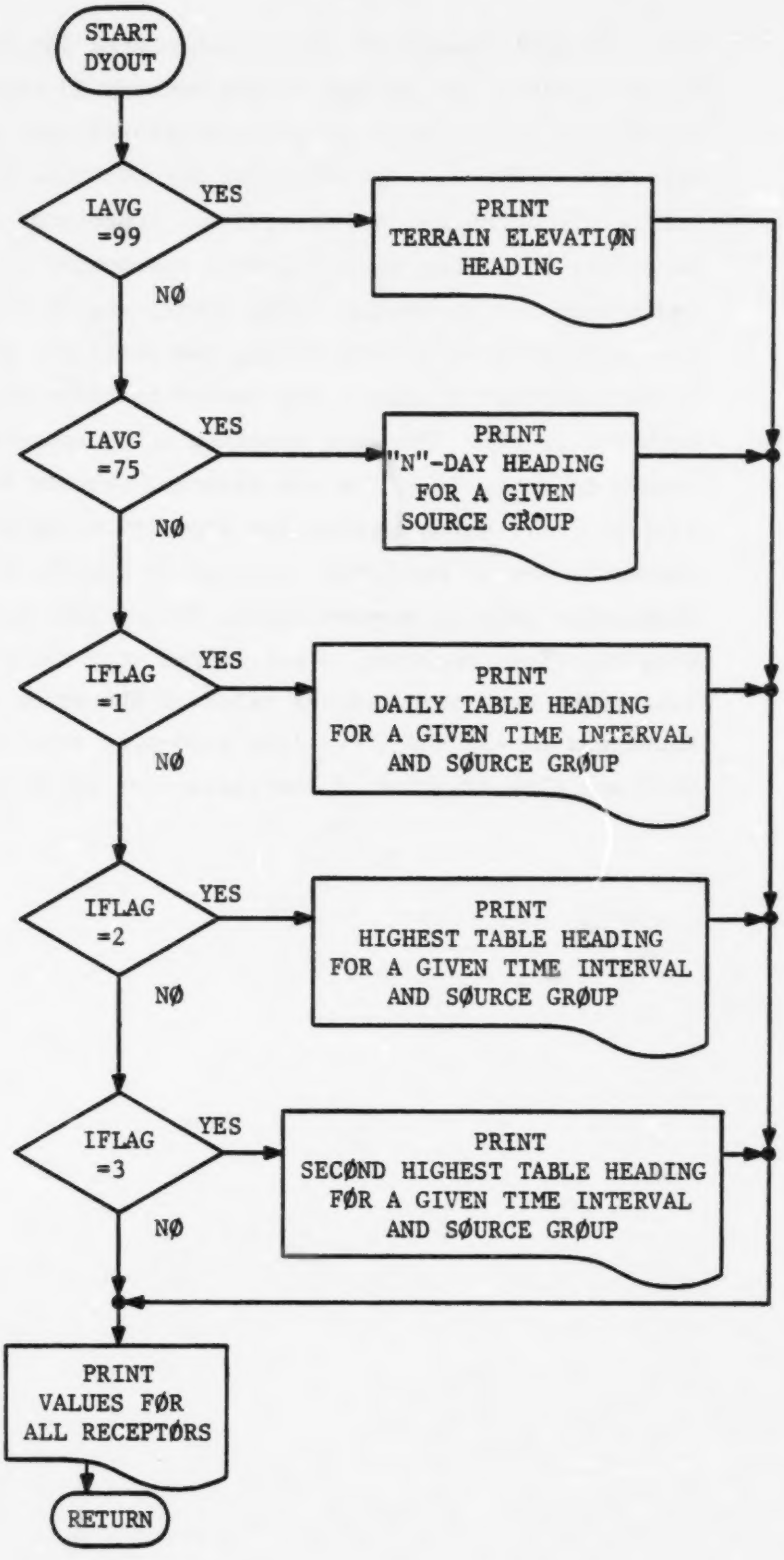

START DYOUT
IAVG =99
YES
NØ
PRINT TERRAIN ELEVATIØN HEADING
IAVG =75
YES
NØ
PRINT "N"-DAY HEADING FOR A GIVEN SOURCE GRØUP
IFLAG =1
YES
NØ
PRINT DAILY TABLE HEADING FOR A GIVEN TIME INTERVAL AND SØURCE GRØUP
IFLAG =2
YES
NØ
PRINT HIGHEST TABLE HEADING FOR A GIVEN TIME INTERVAL AND SØURCE GRØUP
IFLAG =3
YES
NØ
PRINT SECØND HIGHEST TABLE HEADING FØR A GIVEN TIME INTERVAL AND SØURCE GRØUP
PRINT VALUES FØR ALL RECEPTØRS
RETURN

FIGURE H-4. DYOUT Subroutine Flow Diagram.

tion or total deposition values calculated for the problem run. Subroutine MAX50 searches for and stores the maximum 50 average concentration or total deposition values for a given time interval and source group combination. Subroutine VERT aids in computing the Vertical Term when required in calculating concentration or deposition. Subroutine SIGMAZ has three functions. Depending on a flag variable, this subroutine computes a downwind distance index used for accessing arrays containing virtual distances or arrays of constants related to calculating the vertical (σ_z) and horizontal (σ_y) dispersion coefficients. The second function is to calculate σ_z based on Equation (2-17). The last function is to compute the average exponent $(\bar{b})$ (shown in Table 2-8), for the interval between the source and the downwind distance (x), which is used for deposition calculations. Subroutine UPWIND checks to see if the given receptor is upwind of the given source for a particular hour of meteorological data. This subroutine is called only when the given receptor is referenced with the polar coordinate system. Subroutine ERFX computes the value of the error function terms shown in Equations (2-43) and (2-45) for area-type sources. Figures H-5 through H-10 are flow diagrams of the respective subroutines mentioned above.

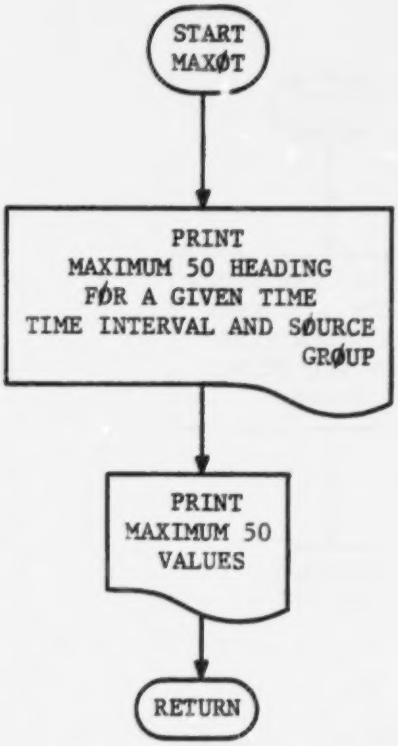

START MAXØT
PRINT MAXIMUM 50 HEADING FØR A GIVEN TIME TIME INTERVAL AND SØURCE GRØUP
PRINT MAXIMUM 50 VALUES
RETURN

FIGURE H-5. MAXOT Subroutine Flow Diagram.

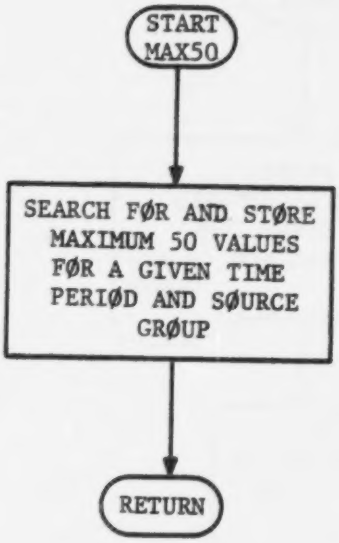

START
MAX50
SEARCH FØR AND STØRE MAXIMUM 50 VALUES FØR A GIVEN TIME PERIØD AND SØURCE GRØUP
RETURN

FIGURE H-6. MAX50 Subroutine Flow Diagram.

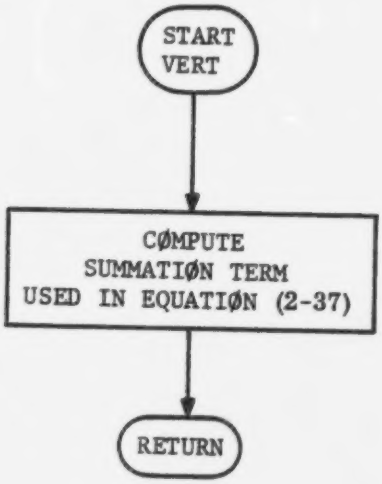

START
VERT
CØMPUTE SUMMATIØN TERM USED IN EQUATIØN (2-37)
RETURN

FIGURE H-7. VERT Subroutine Flow Diagram.

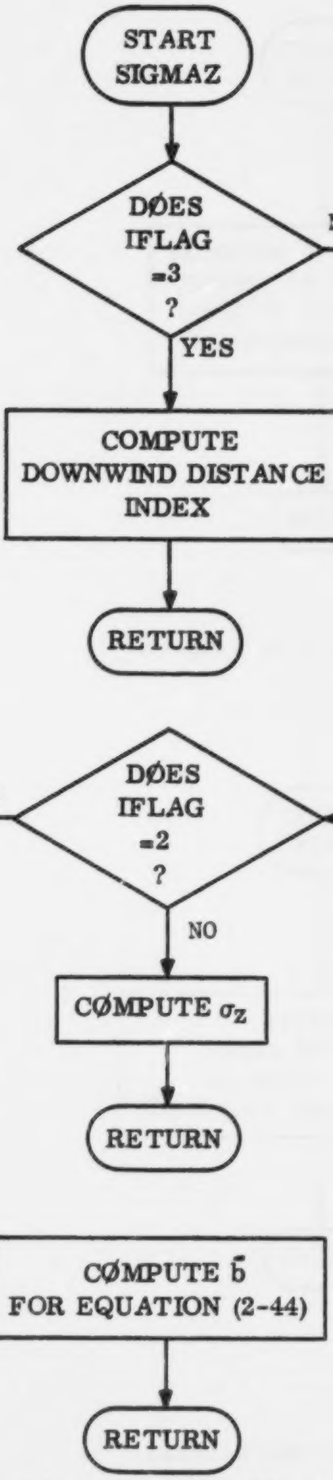

START SIGMAZ
DØES IFLAG =3 ?
NO
YES
COMPUTE DOWNWIND DISTANCE INDEX
RETURN
DØES IFLAG =2 ?
YES
NO
CØMPUTE σ_z
RETURN
CØMPUTE $\bar{b}$ FOR EQUATION (2-44)
RETURN

FIGURE H-8. SIGMAZ Subroutine Flow Diagram.

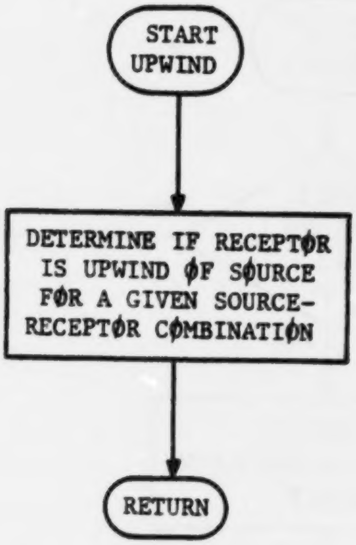

START
UPWIND
DETERMINE IF RECEPTØR IS UPWIND ØF SØURCE FØR A GIVEN SOURCE-RECEPTØR CØMBINATIØN
RETURN

FIGURE H-9. UPWIND Subroutine Flow Diagram.

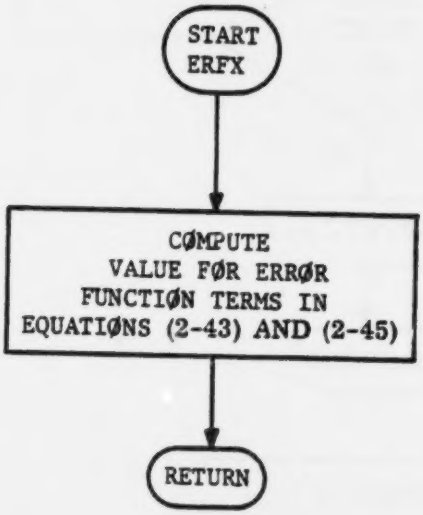

START
ERFX
CØMPUTE VALUE FØR ERRØR FUNCTIØN TERMS IN EQUATIØNS (2-43) AND (2-45)
RETURN

FIGURE H-10. ERFX Subroutine Flow Diagram.

APPENDIX I

LOGIC FLOW DESCRIPTION OF THE ISC LONG-TERM MODEL (ISCLT) COMPUTER PROGRAM

The ISCLT computer program consists of a main program (ISCLT) and 15 subroutines (MODEL, OUTPT, HEADNG, MXIMUM, CHECKR, SUMMER, TITLR, DISTR, FUNCT, VERTC1, VERTC2, VERTC3, SIGMAZ, VIRTZ and VIRTY). The FORTRAN source code of these routines is given in Appendix B.

The main routine (ISCLT) of the program is responsible for initializing the program and starting the input data read sequence. This routine reads the problem run title, the program options data and those variables that specify the size (number of values) of required data parameter arrays. The primary function of this routine is to calculate the amount of storage required by the input receptor arrays, elevation array and the concentration or deposition calculation arrays. The program has been designed to store these data in 40,000 words in BLANK COMMON. The program calculates the starting location of each array and passes this information to the main calculation routine (MODEL). The program may use all or part of BLANK COMMON depending on the program options selected. The amount of BLANK COMMON required for a given problem run is calculated by Equation (3-3) in Section 3.2.2. Figure I-1 is a logic flow diagram of the main program.

Subroutine MODEL is the principal processing routine of the ISCLT program. This routine reads the receptor, elevation and meteorological data from input card images or from magnetic tape. The program provides default data values for most variables set by input card and begins a loop over all input sources. If a source is a new source from data card, concentration or deposition is calculated using the long-term model equations. If a source is a previous source from an input tape, its concentration or deposition arrays are read from tape. New and/or previous sources and their respective

MAIN PROGRAM ISCLT

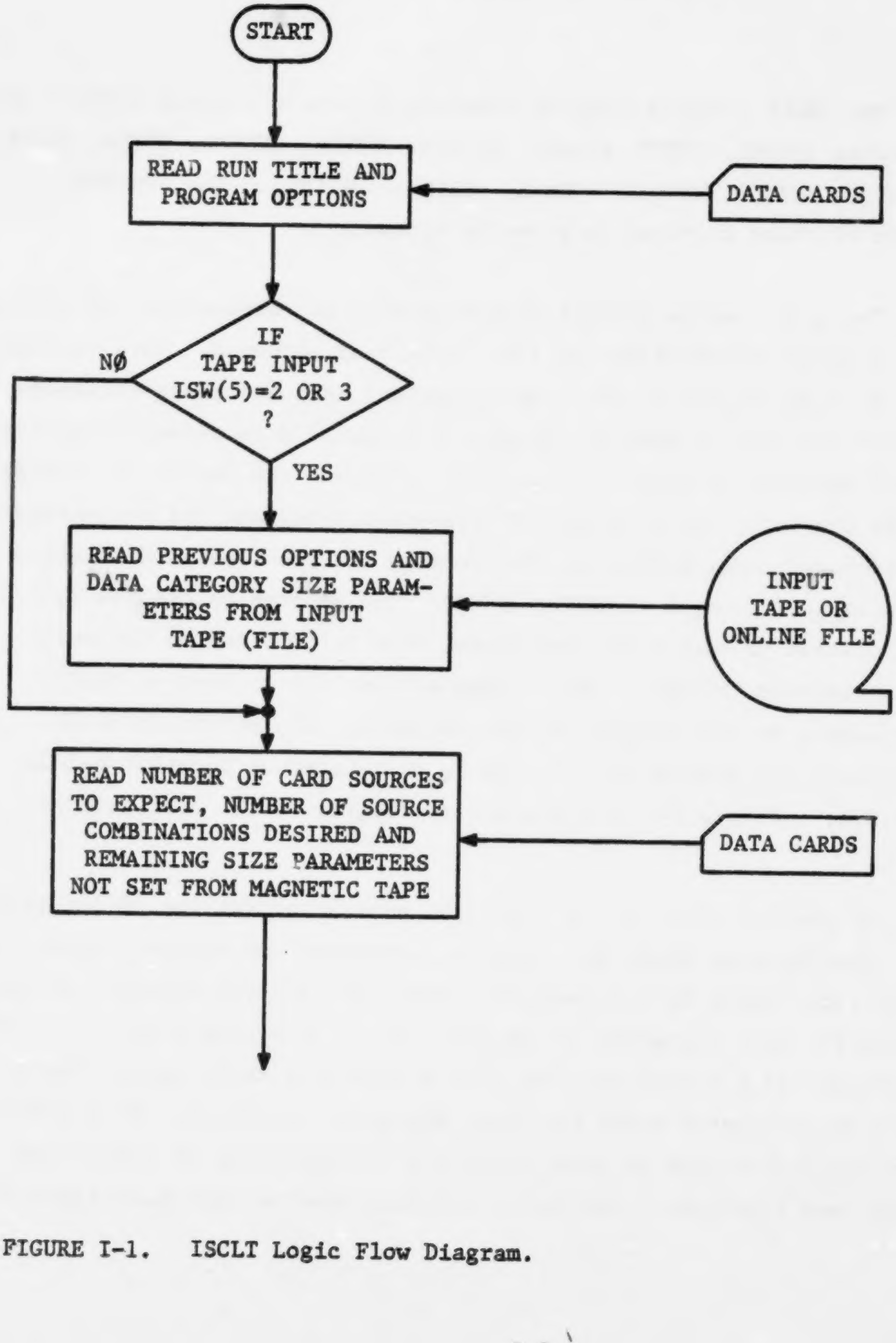

START
READ RUN TITLE AND PROGRAM OPTIONS
DATA CARDS
IF TAPE INPUT ISW(5)=2 OR 3 ?
NØ
YES
READ PREVIOUS OPTIONS AND DATA CATEGORY SIZE PARAMETERS FROM INPUT TAPE (FILE)
INPUT TAPE OR ONLINE FILE
READ NUMBER OF CARD SOURCES TO EXPECT, NUMBER OF SOURCE COMBINATIONS DESIRED AND REMAINING SIZE PARAMETERS NOT SET FROM MAGNETIC TAPE
DATA CARDS

FIGURE I-1. ISCLT Logic Flow Diagram.

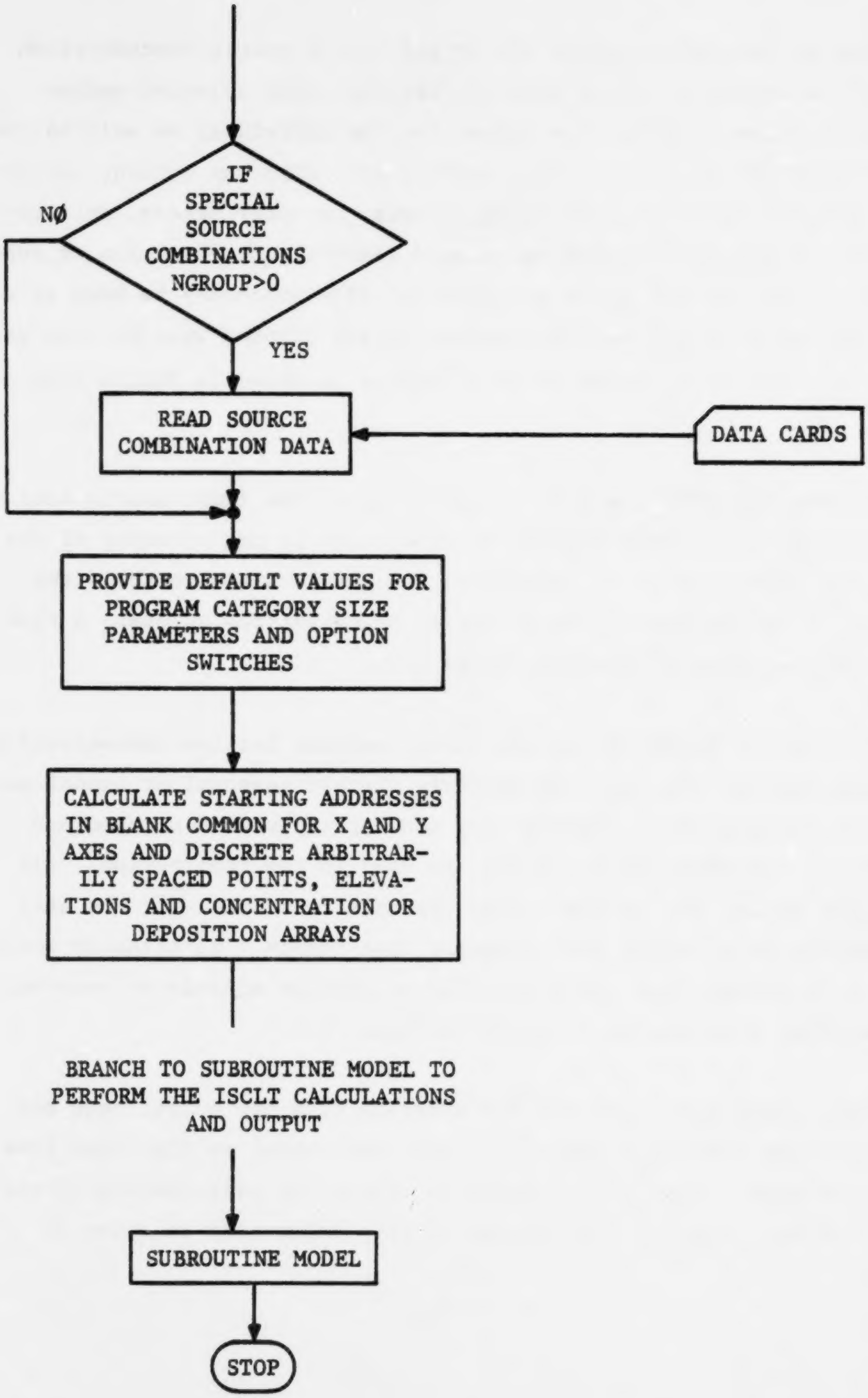

IF
SPECIAL
SOURCE
COMBINATIONS
NGROUP>0
NØ
YES
READ SOURCE
COMBINATION DATA
DATA CARDS
PROVIDE DEFAULT VALUES FOR
PROGRAM CATEGORY SIZE
PARAMETERS AND OPTION
SWITCHES
CALCULATE STARTING ADDRESSES
IN BLANK COMMON FOR X AND Y
AXES AND DISCRETE ARBITRARILY SPACED POINTS, ELEVATIONS AND CONCENTRATION OR
DEPOSITION ARRAYS
BRANCH TO SUBROUTINE MODEL TO
PERFORM THE ISCLT CALCULATIONS
AND OUTPUT
SUBROUTINE MODEL
STOP

FIGURE I-1. (Continued)

concentration or deposition arrays are merged into a source/concentration (deposition) inventory of one or more sources for which seasonal and/or annual concentration or deposition values for the individual as well as the combined sources can be output. This routine will also, on option, output all of the program input data including options, receptor arrays, meteorological data, source data and the calculated seasonal concentration or deposition values to tape to be held as a historical file which may be used at a later date to update or to retrive information not printed when the tape was generated. A logic flow diagram of this routine is shown in Figure I-2.

Subroutine OUTPT controls the printing of the input source data if this option is choosen. This subroutine also controls the printing of the results of all concentration or deposition calculations and controls the calculations of the maximum 10 concentration or deposition values. A flow diagram of this routine is shown in Figure I-3.

Subroutine HEADNG prints the table headings for the concentration or deposition tables. The headings identify whether seasonal or annual calculations are being printed, whether they are for individual or combined sources and, if combined, which sources are used in the combination. All program output tables are labeled either seasonal or annual. If the user is using monthly data, he/she must remember that season 1 is actually month 1, etc., and an annual label would actually be average monthly or seasonal. A flow diagram of this routine is shown in Figure I-4.

Subroutine TITLR controls the starting of a new output page and writes the problem run title information and page number as the first line of each output page. Also, this subroutine writes the main heading of the input data tables. A logic flow diagram of this subroutine is shown in Figure I-5.

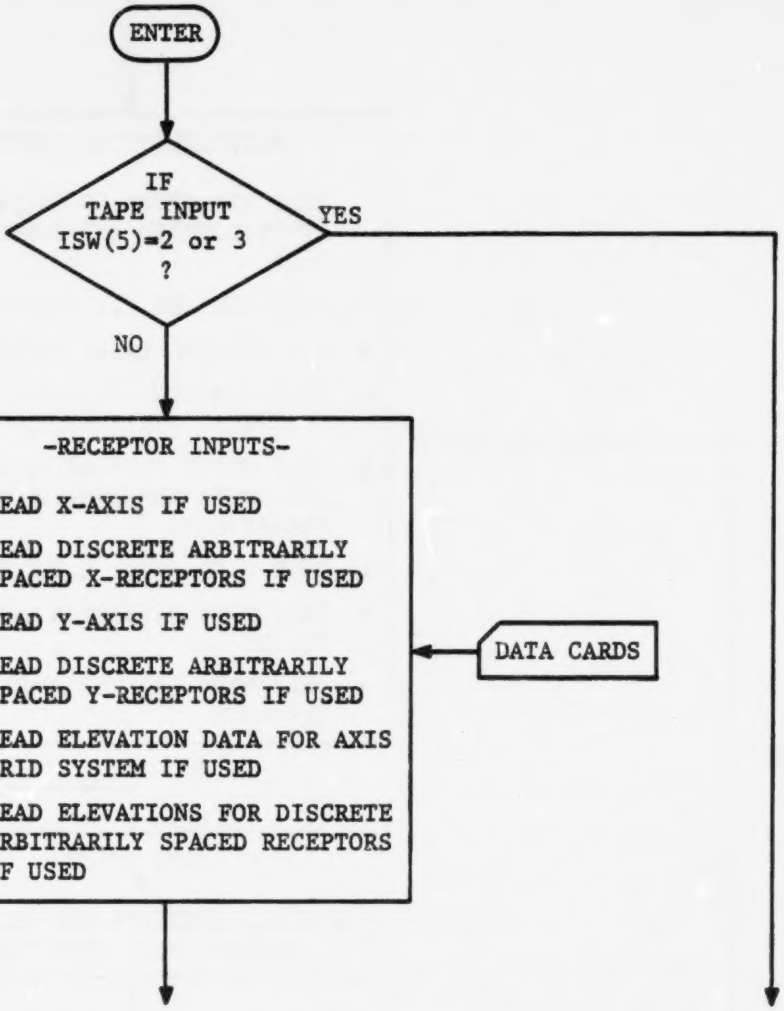

ENTER
IF
TAPE INPUT
ISW(5)=2 or 3
?
YES
NO
-RECEPTOR INPUTS-
• READ X-AXIS IF USED
• READ DISCRETE ARBITRARILY SPACED X-RECEPTORS IF USED
• READ Y-AXIS IF USED
• READ DISCRETE ARBITRARILY SPACED Y-RECEPTORS IF USED
• READ ELEVATION DATA FOR AXIS GRID SYSTEM IF USED
• READ ELEVATIONS FOR DISCRETE ARBITRARILY SPACED RECEPTORS IF USED
DATA CARDS

FIGURE I-2. Model Logic Flow Diagram -- Subroutine MODEL. This subroutine is the main calculation and control program. This program controls the source and meteorology input, output and calculations and contains most of the concentration and deposition equations.

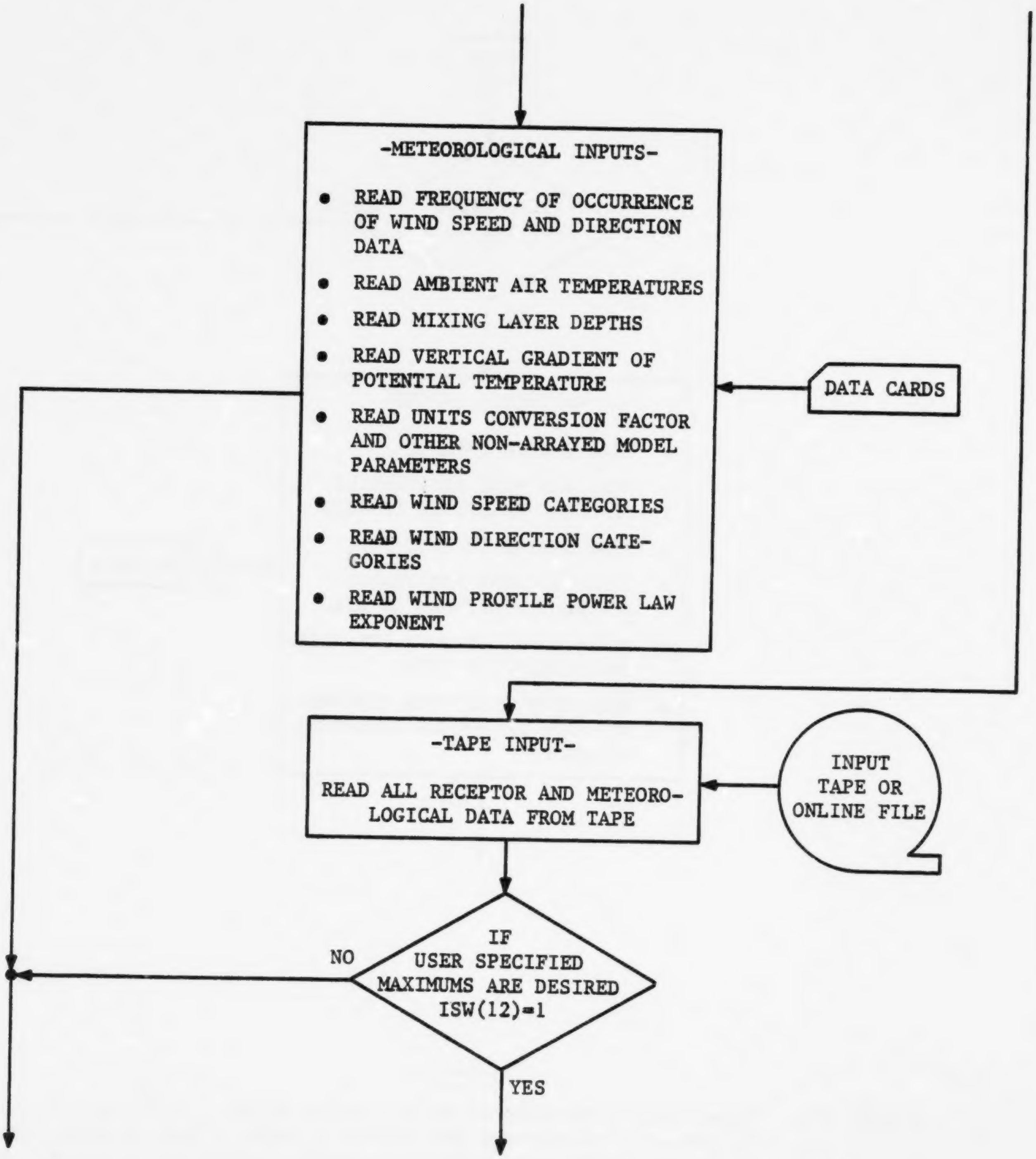

-METEOROLOGICAL INPUTS-
• READ FREQUENCY OF OCCURRENCE OF WIND SPEED AND DIRECTION DATA
• READ AMBIENT AIR TEMPERATURES
• READ MIXING LAYER DEPTHS
• READ VERTICAL GRADIENT OF POTENTIAL TEMPERATURE
• READ UNITS CONVERSION FACTOR AND OTHER NON-ARRAYED MODEL PARAMETERS
• READ WIND SPEED CATEGORIES
• READ WIND DIRECTION CATEGORIES
• READ WIND PROFILE POWER LAW EXPONENT
DATA CARDS
-TAPE INPUT-
READ ALL RECEPTOR AND METEOROLOGICAL DATA FROM TAPE
INPUT TAPE OR ONLINE FILE
IF USER SPECIFIED MAXIMUMS ARE DESIRED ISW(12)=1
NO
YES

FIGURE I-2. (Continued)

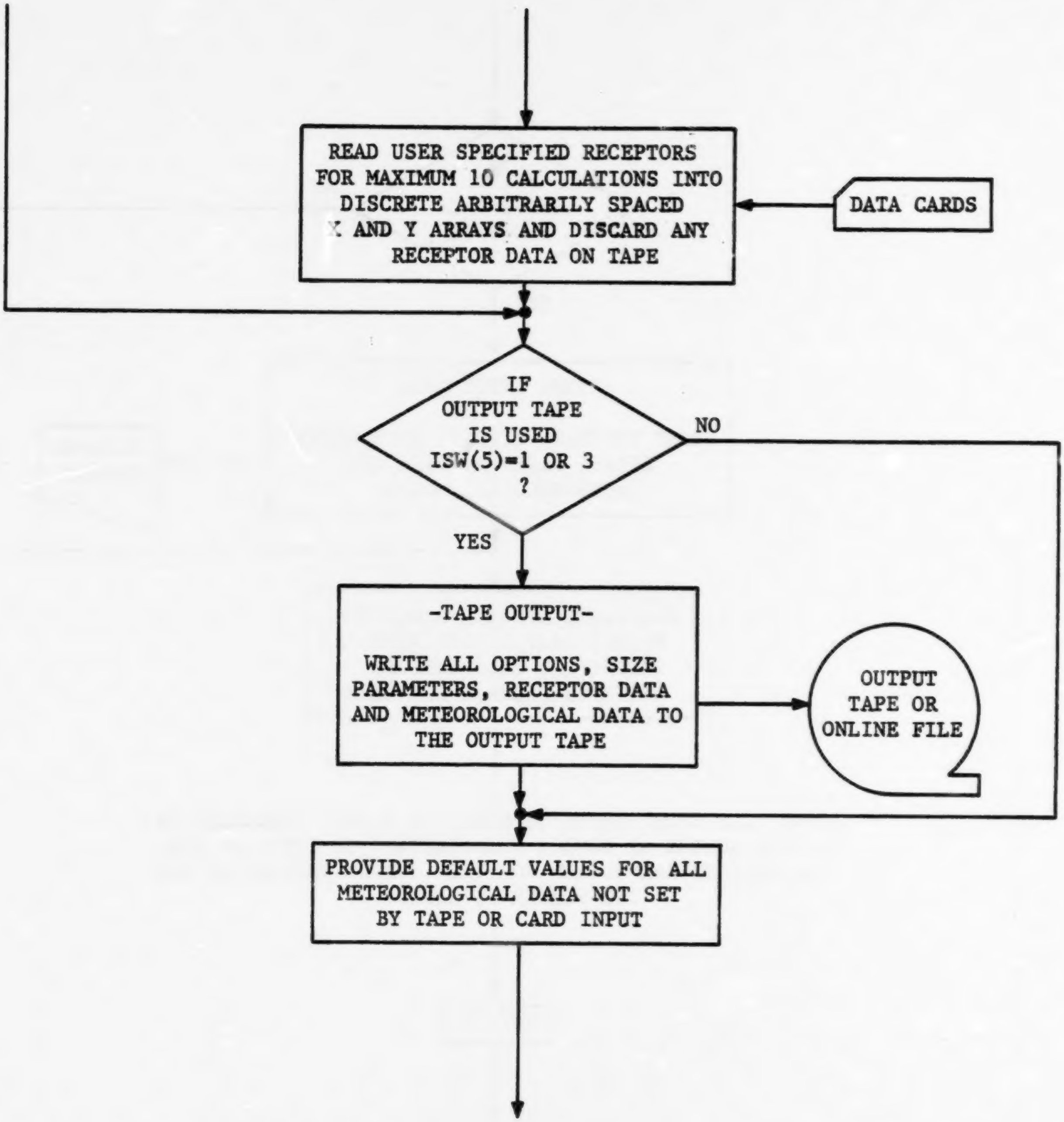

READ USER SPECIFIED RECEPTORS FOR MAXIMUM 10 CALCULATIONS INTO DISCRETE ARBITRARILY SPACED X AND Y ARRAYS AND DISCARD ANY RECEPTOR DATA ON TAPE
DATA CARDS
IF OUTPUT TAPE IS USED ISW(5)=1 OR 3 ?
NO
YES
-TAPE OUTPUT-
WRITE ALL OPTIONS, SIZE PARAMETERS, RECEPTOR DATA AND METEOROLOGICAL DATA TO THE OUTPUT TAPE
OUTPUT TAPE OR ONLINE FILE
PROVIDE DEFAULT VALUES FOR ALL METEOROLOGICAL DATA NOT SET BY TAPE OR CARD INPUT

FIGURE I-2. (Continued)

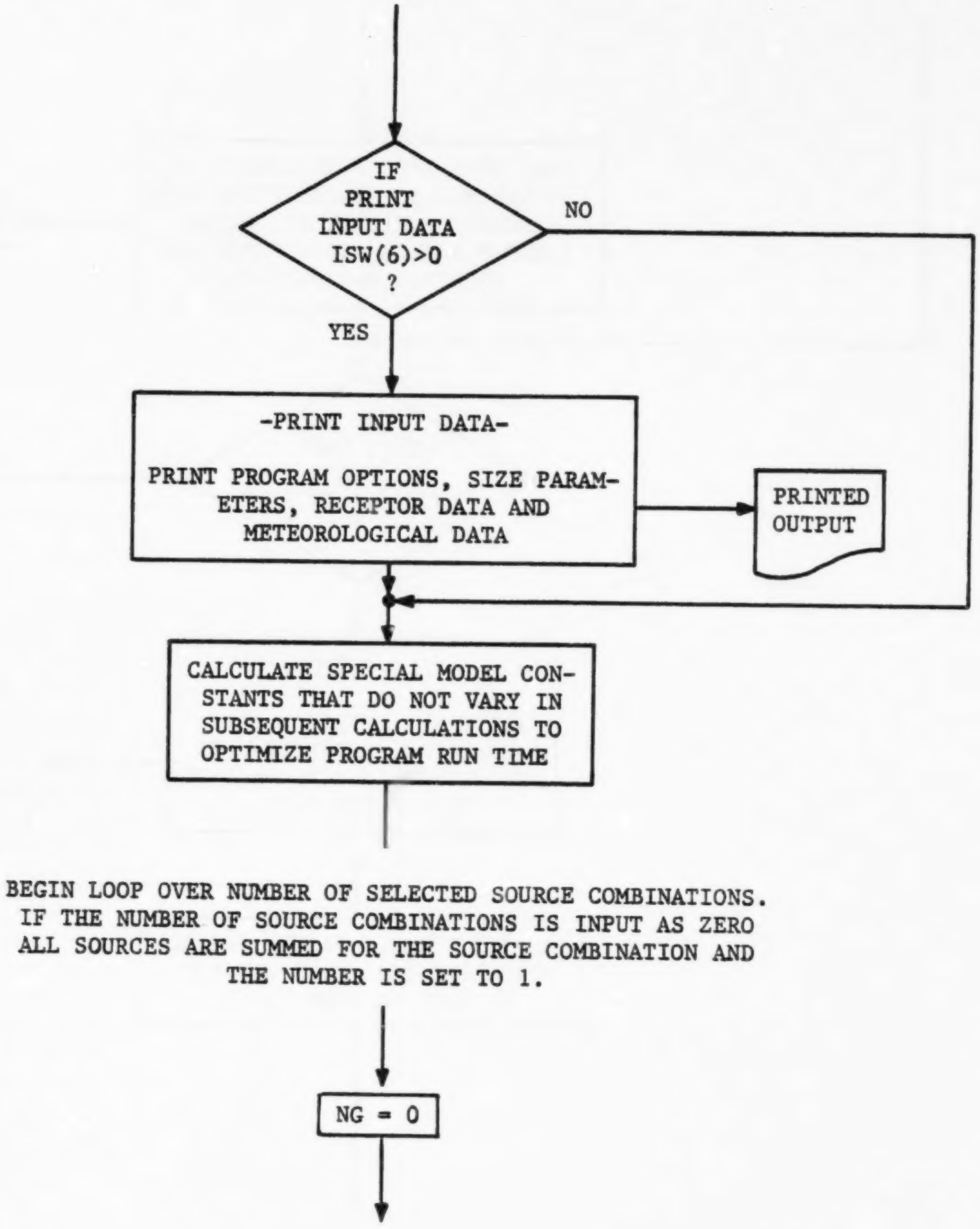

IF PRINT INPUT DATA ISW(6)>0 ?
NO
YES
-PRINT INPUT DATA-
PRINT PROGRAM OPTIONS, SIZE PARAMETERS, RECEPTOR DATA AND METEOROLOGICAL DATA
PRINTED OUTPUT
CALCULATE SPECIAL MODEL CONSTANTS THAT DO NOT VARY IN SUBSEQUENT CALCULATIONS TO OPTIMIZE PROGRAM RUN TIME
BEGIN LOOP OVER NUMBER OF SELECTED SOURCE COMBINATIONS. IF THE NUMBER OF SOURCE COMBINATIONS IS INPUT AS ZERO ALL SOURCES ARE SUMMED FOR THE SOURCE COMBINATION AND THE NUMBER IS SET TO 1.
NG = 0

FIGURE I-2. (Continued)

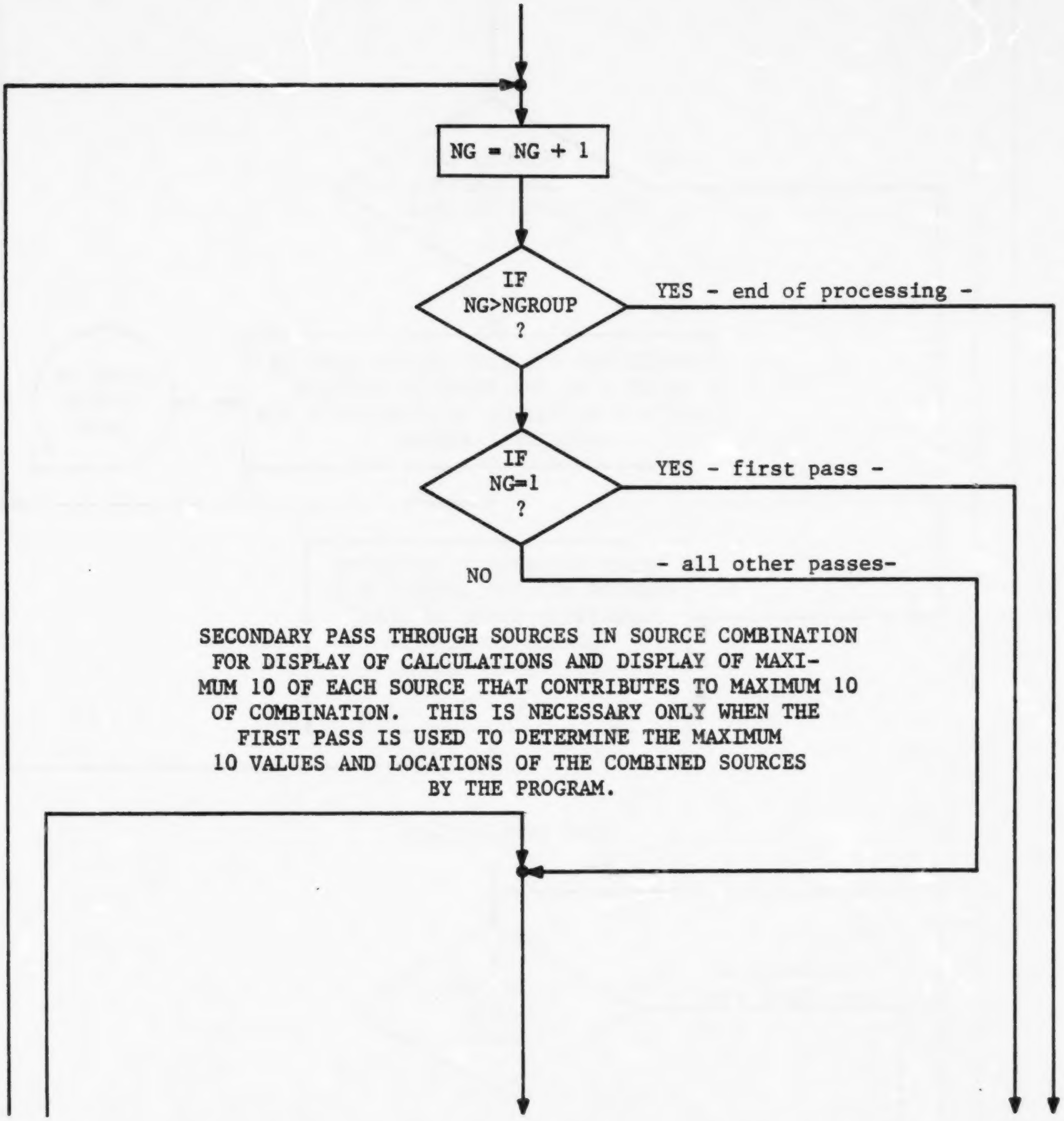

NG = NG + 1
IF NG>NGROUP ?
YES - end of processing -
IF NG=1 ?
YES - first pass -
NO
- all other passes-
SECONDARY PASS THROUGH SOURCES IN SOURCE COMBINATION FOR DISPLAY OF CALCULATIONS AND DISPLAY OF MAXIMUM 10 OF EACH SOURCE THAT CONTRIBUTES TO MAXIMUM 10 OF COMBINATION. THIS IS NECESSARY ONLY WHEN THE FIRST PASS IS USED TO DETERMINE THE MAXIMUM 10 VALUES AND LOCATIONS OF THE COMBINED SOURCES BY THE PROGRAM.

FIGURE I-2. (Continued)

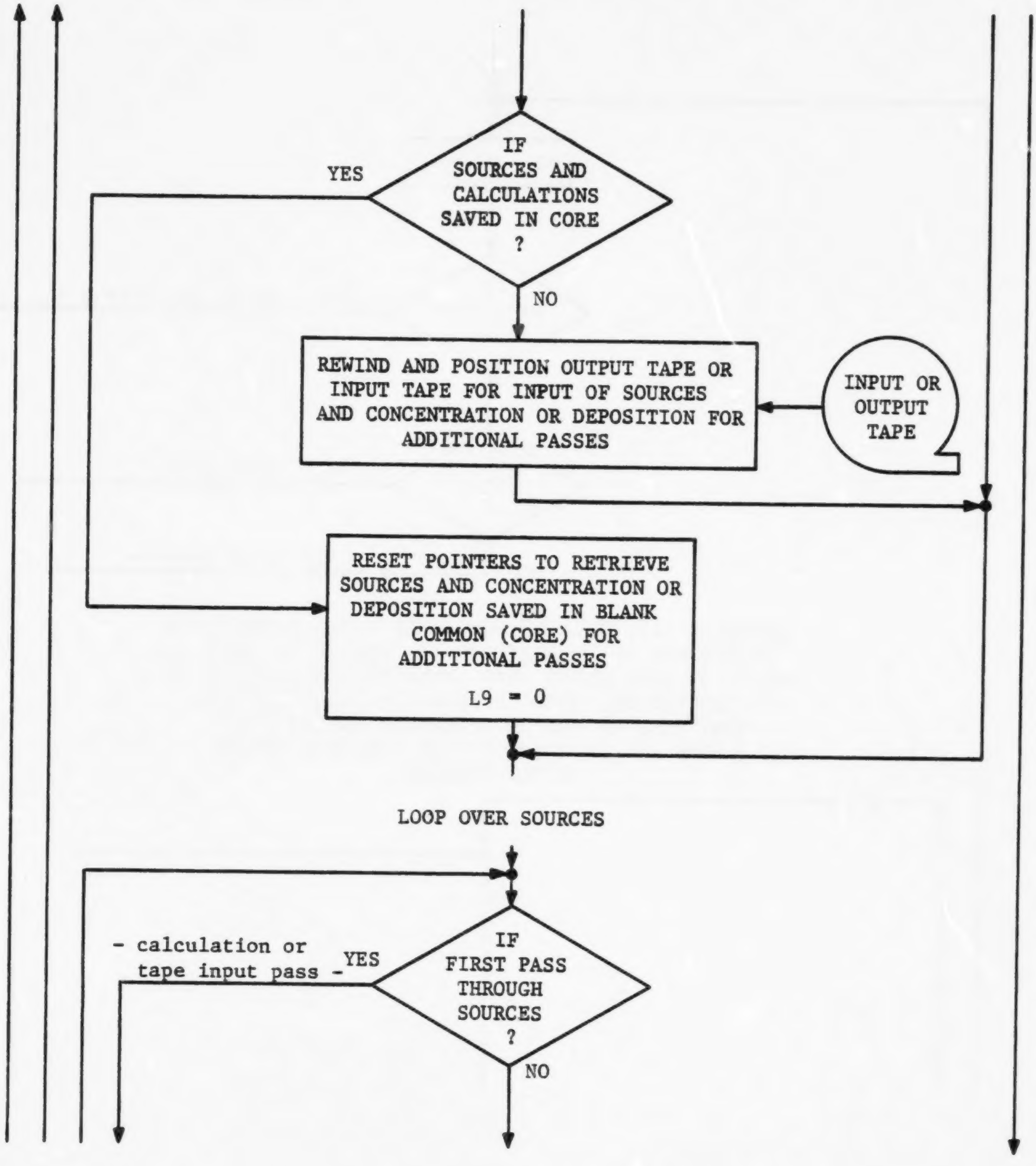

IF SOURCES AND CALCULATIONS SAVED IN CORE ?
YES
NO
REWIND AND POSITION OUTPUT TAPE OR INPUT TAPE FOR INPUT OF SOURCES AND CONCENTRATION OR DEPOSITION FOR ADDITIONAL PASSES
INPUT OR OUTPUT TAPE
RESET POINTERS TO RETRIEVE SOURCES AND CONCENTRATION OR DEPOSITION SAVED IN BLANK COMMON (CORE) FOR ADDITIONAL PASSES
L9 = 0
LOOP OVER SOURCES
- calculation or tape input pass -
YES
IF FIRST PASS THROUGH SOURCES ?
NO

FIGURE I-2. (Continued)

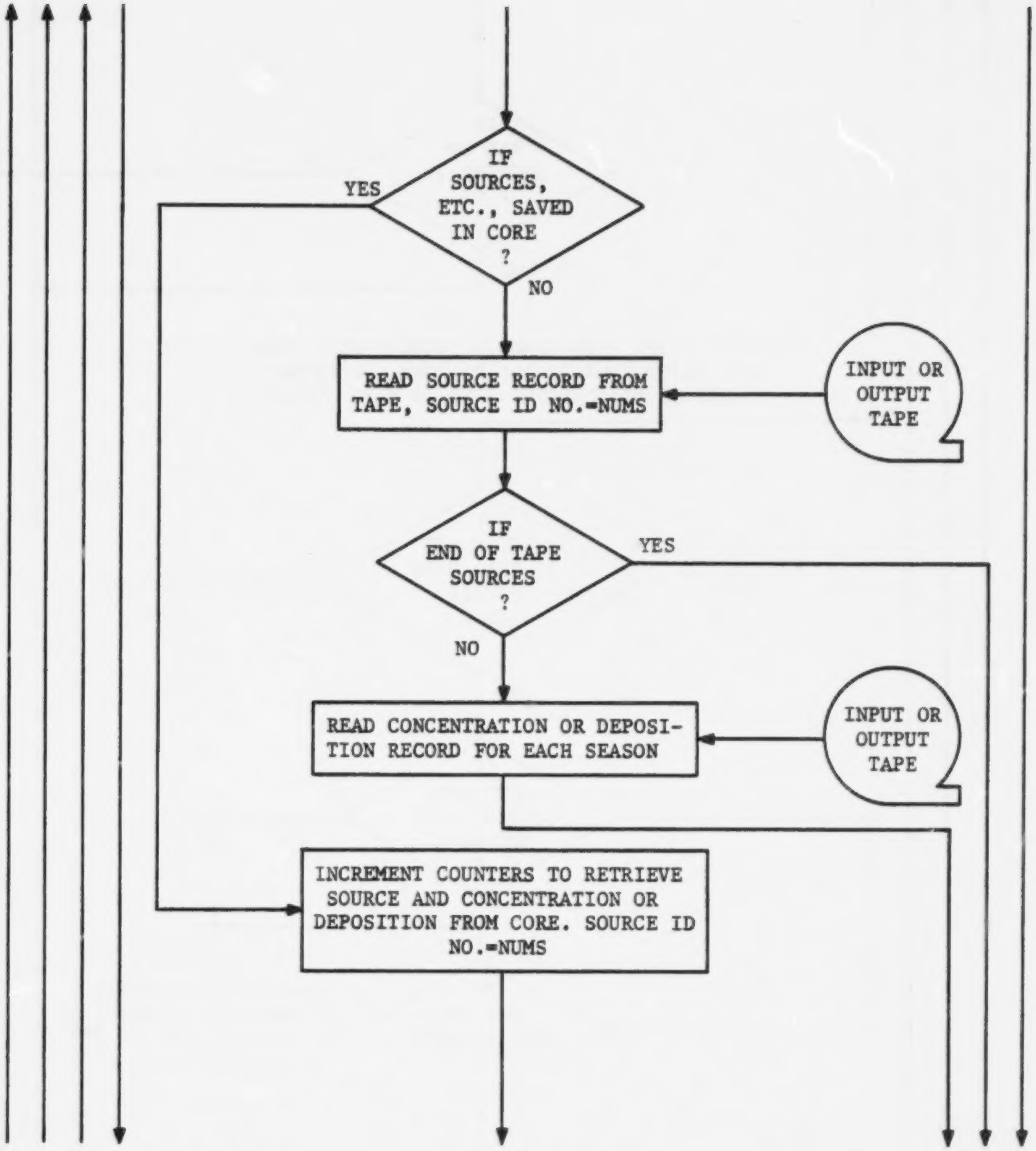

IF SOURCES, ETC., SAVED IN CORE ?
YES
NO
READ SOURCE RECORD FROM TAPE, SOURCE ID NO.=NUMS
INPUT OR OUTPUT TAPE
IF END OF TAPE SOURCES ?
YES
NO
READ CONCENTRATION OR DEPOSITION RECORD FOR EACH SEASON
INPUT OR OUTPUT TAPE
INCREMENT COUNTERS TO RETRIEVE SOURCE AND CONCENTRATION OR DEPOSITION FROM CORE. SOURCE ID NO.=NUMS

FIGURE I-2. (Continued)

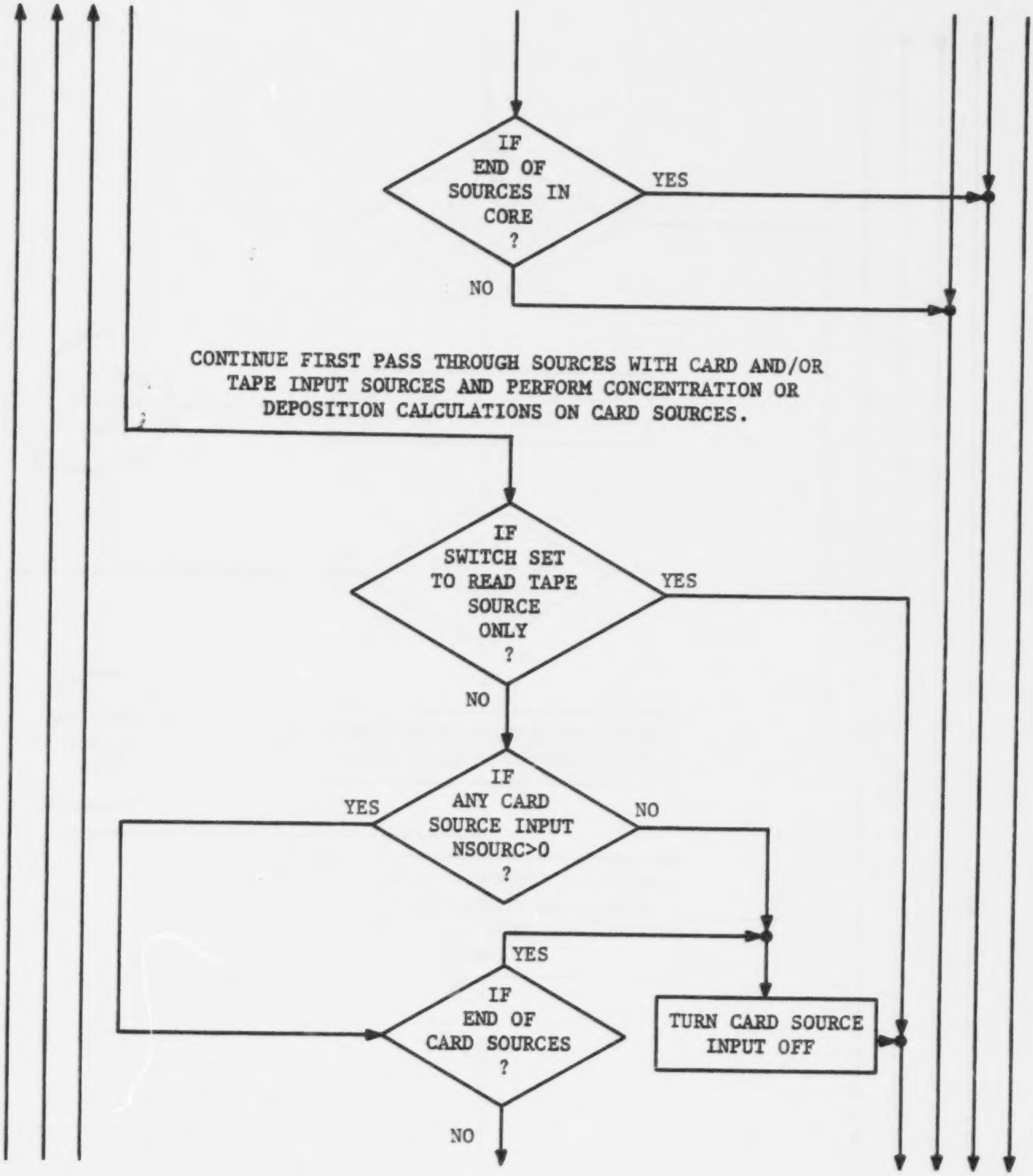
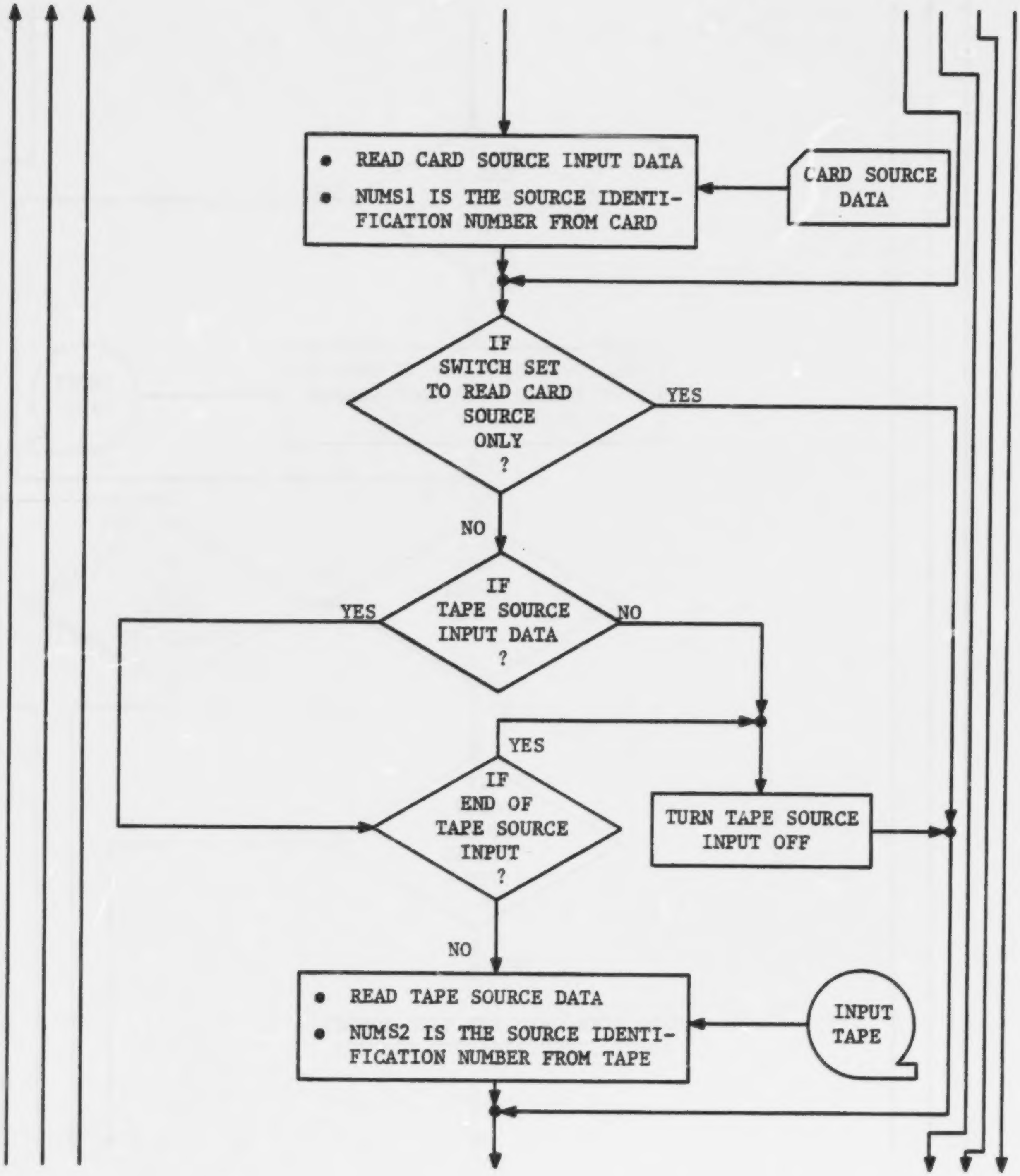

IF END OF SOURCES IN CORE ?
YES
NO
CONTINUE FIRST PASS THROUGH SOURCES WITH CARD AND/OR TAPE INPUT SOURCES AND PERFORM CONCENTRATION OR DEPOSITION CALCULATIONS ON CARD SOURCES.
IF SWITCH SET TO READ TAPE SOURCE ONLY ?
YES
NO
IF ANY CARD SOURCE INPUT NSOURC>0 ?
YES
NO
YES
IF END OF CARD SOURCES ?
TURN CARD SOURCE INPUT OFF
NO

FIGURE I-2. (Continued)



• READ CARD SOURCE INPUT DATA
• NUMS1 IS THE SOURCE IDENTIFICATION NUMBER FROM CARD
CARD SOURCE DATA
IF SWITCH SET TO READ CARD SOURCE ONLY ?
YES
NO
IF TAPE SOURCE INPUT DATA ?
YES
NO
YES
IF END OF TAPE SOURCE INPUT ?
TURN TAPE SOURCE INPUT OFF
NO
• READ TAPE SOURCE DATA
• NUMS2 IS THE SOURCE IDENTIFICATION NUMBER FROM TAPE
INPUT TAPE

FIGURE I-2. (Continued)

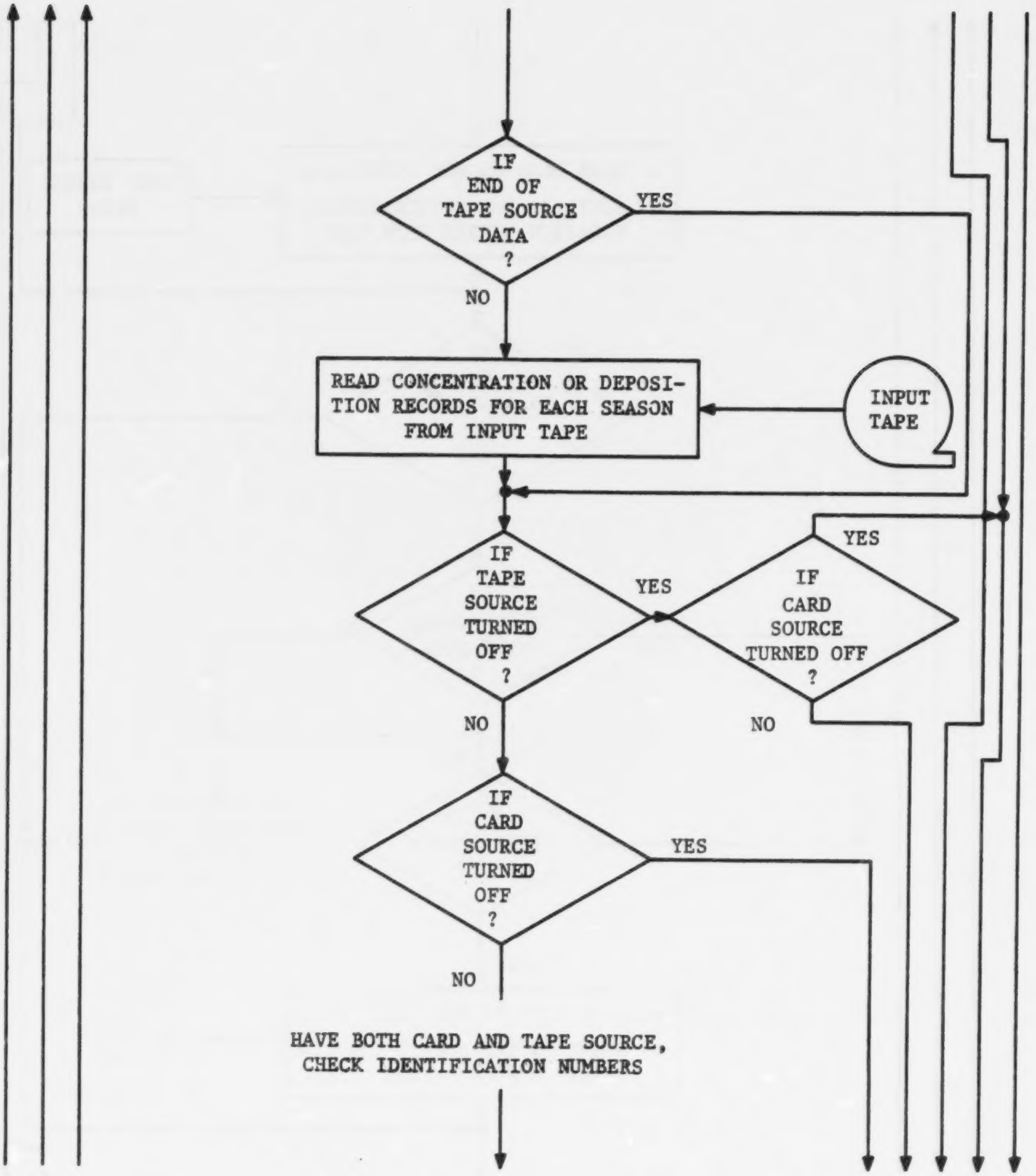

IF END OF TAPE SOURCE DATA ?
YES
NO
READ CONCENTRATION OR DEPOSITION RECORDS FOR EACH SEASON FROM INPUT TAPE
INPUT TAPE
IF TAPE SOURCE TURNED OFF ?
YES
NO
IF CARD SOURCE TURNED OFF ?
YES
NO
IF CARD SOURCE TURNED OFF ?
YES
NO
HAVE BOTH CARD AND TAPE SOURCE, CHECK IDENTIFICATION NUMBERS

FIGURE I-2. (Continued)

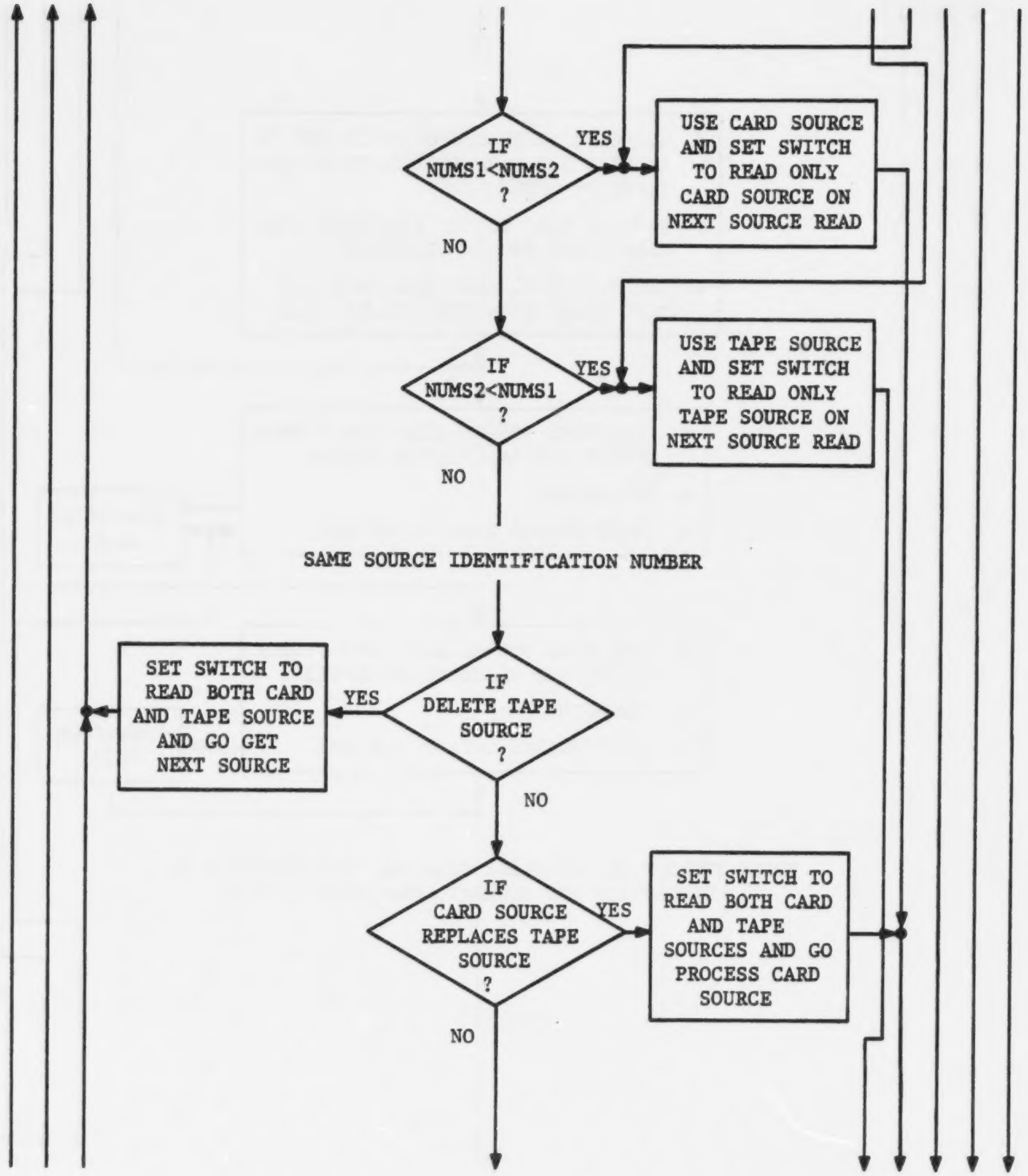

IF
NUMS1<NUMS2
?
YES
USE CARD SOURCE AND SET SWITCH TO READ ONLY CARD SOURCE ON NEXT SOURCE READ
NO
IF
NUMS2<NUMS1
?
YES
USE TAPE SOURCE AND SET SWITCH TO READ ONLY TAPE SOURCE ON NEXT SOURCE READ
NO
SAME SOURCE IDENTIFICATION NUMBER
IF
DELETE TAPE
SOURCE
?
YES
SET SWITCH TO READ BOTH CARD AND TAPE SOURCE AND GO GET NEXT SOURCE
NO
IF
CARD SOURCE
REPLACES TAPE
SOURCE
?
YES
SET SWITCH TO READ BOTH CARD AND TAPE SOURCES AND GO PROCESS CARD SOURCE
NO

FIGURE I-2. (Continued)

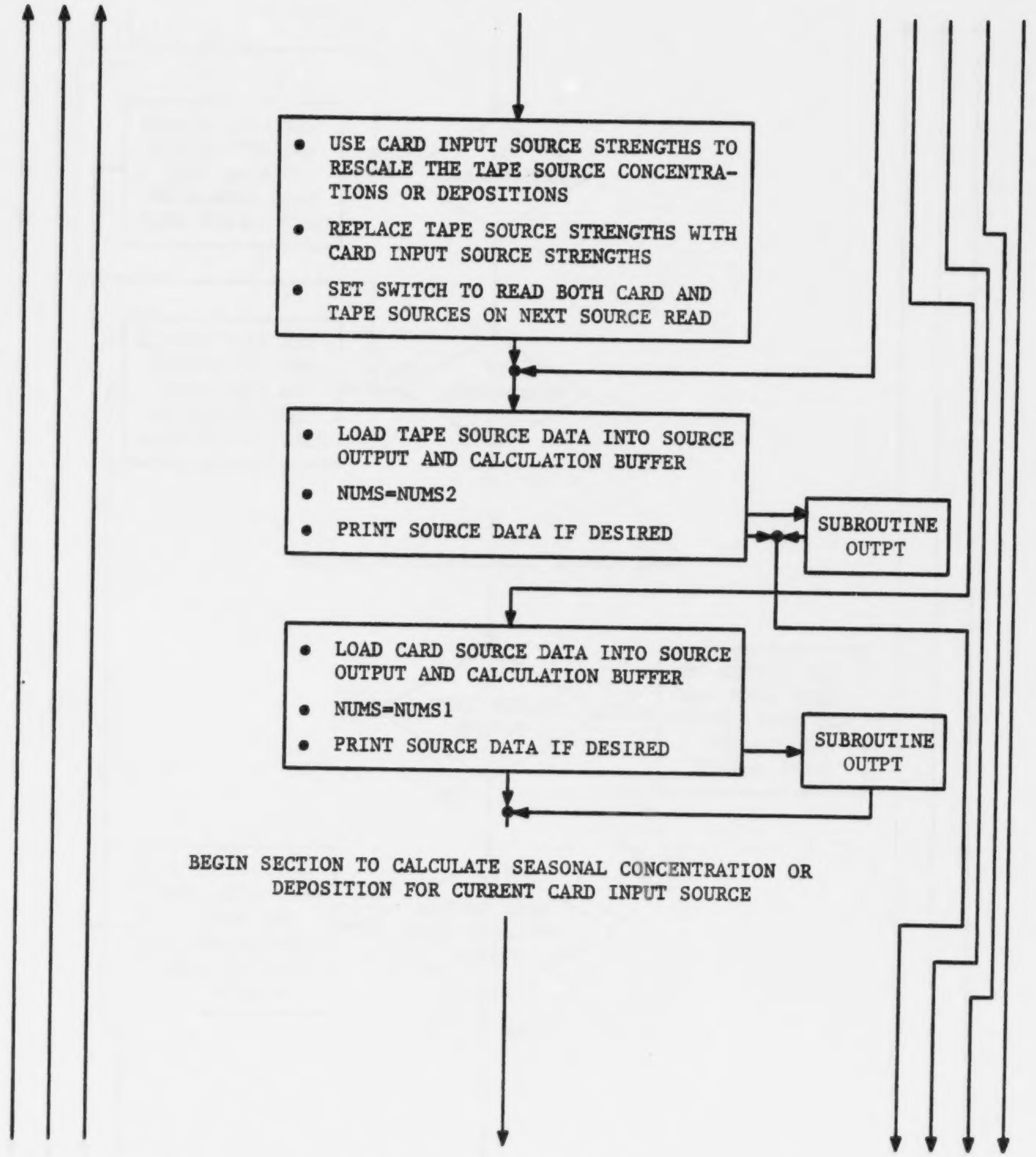

• USE CARD INPUT SOURCE STRENGTHS TO RESCALE THE TAPE SOURCE CONCENTRATIONS OR DEPOSITIONS
• REPLACE TAPE SOURCE STRENGTHS WITH CARD INPUT SOURCE STRENGTHS
• SET SWITCH TO READ BOTH CARD AND TAPE SOURCES ON NEXT SOURCE READ
• LOAD TAPE SOURCE DATA INTO SOURCE OUTPUT AND CALCULATION BUFFER
• NUMS=NUMS2
• PRINT SOURCE DATA IF DESIRED
SUBROUTINE OUTPT
• LOAD CARD SOURCE DATA INTO SOURCE OUTPUT AND CALCULATION BUFFER
• NUMS=NUMS1
• PRINT SOURCE DATA IF DESIRED
SUBROUTINE OUTPT
BEGIN SECTION TO CALCULATE SEASONAL CONCENTRATION OR DEPOSITION FOR CURRENT CARD INPUT SOURCE

FIGURE I-2. (Continued)

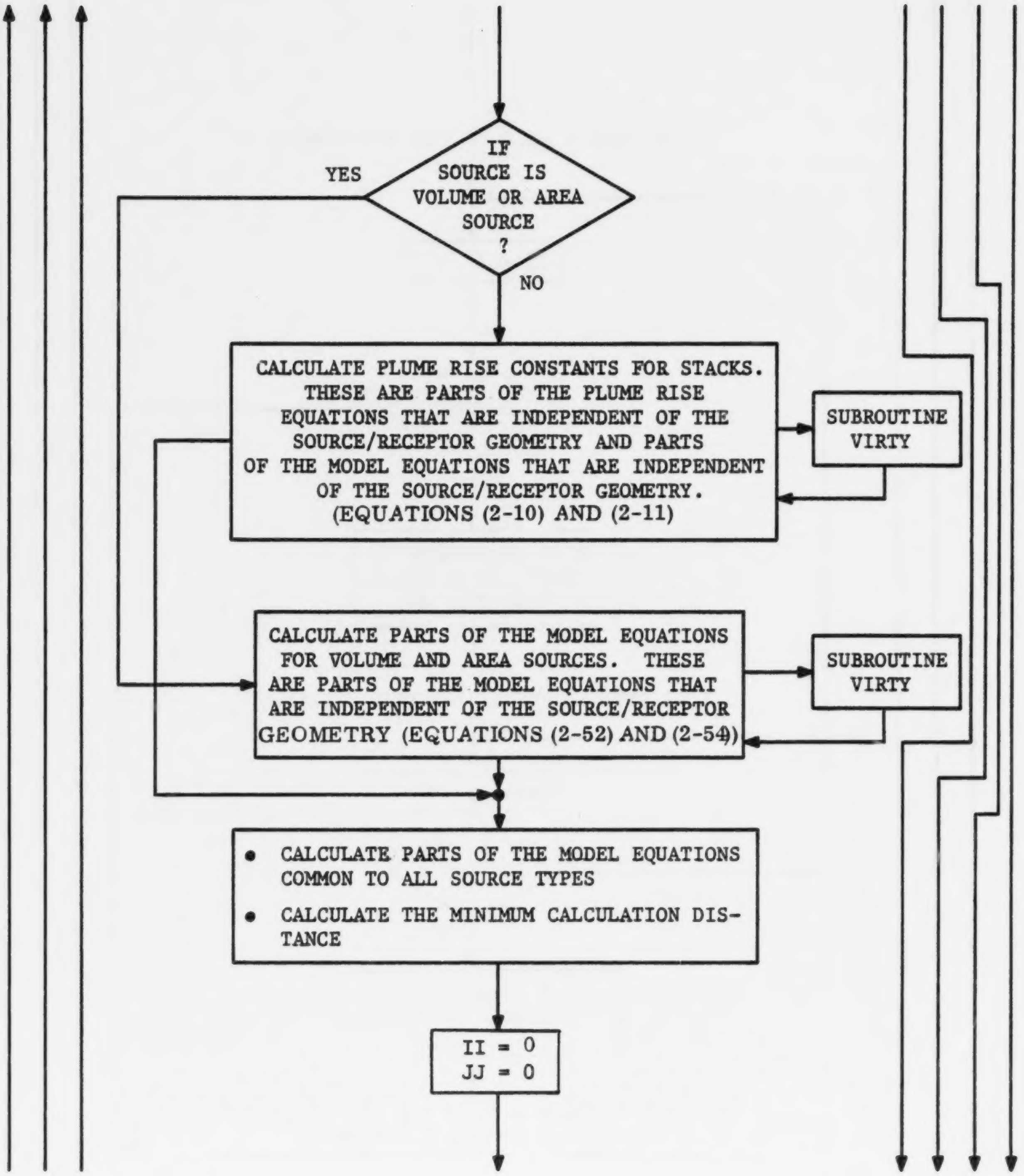

IF SOURCE IS VOLUME OR AREA SOURCE ?
YES
NO
CALCULATE PLUME RISE CONSTANTS FOR STACKS. THESE ARE PARTS OF THE PLUME RISE EQUATIONS THAT ARE INDEPENDENT OF THE SOURCE/RECEPTOR GEOMETRY AND PARTS OF THE MODEL EQUATIONS THAT ARE INDEPENDENT OF THE SOURCE/RECEPTOR GEOMETRY. (EQUATIONS (2-10) AND (2-11)
SUBROUTINE VIRTY
CALCULATE PARTS OF THE MODEL EQUATIONS FOR VOLUME AND AREA SOURCES. THESE ARE PARTS OF THE MODEL EQUATIONS THAT ARE INDEPENDENT OF THE SOURCE/RECEPTOR GEOMETRY (EQUATIONS (2-52) AND (2-54))
SUBROUTINE VIRTY
• CALCULATE PARTS OF THE MODEL EQUATIONS COMMON TO ALL SOURCE TYPES
• CALCULATE THE MINIMUM CALCULATION DISTANCE
II = 0
JJ = 0

FIGURE I-2. (Continued)

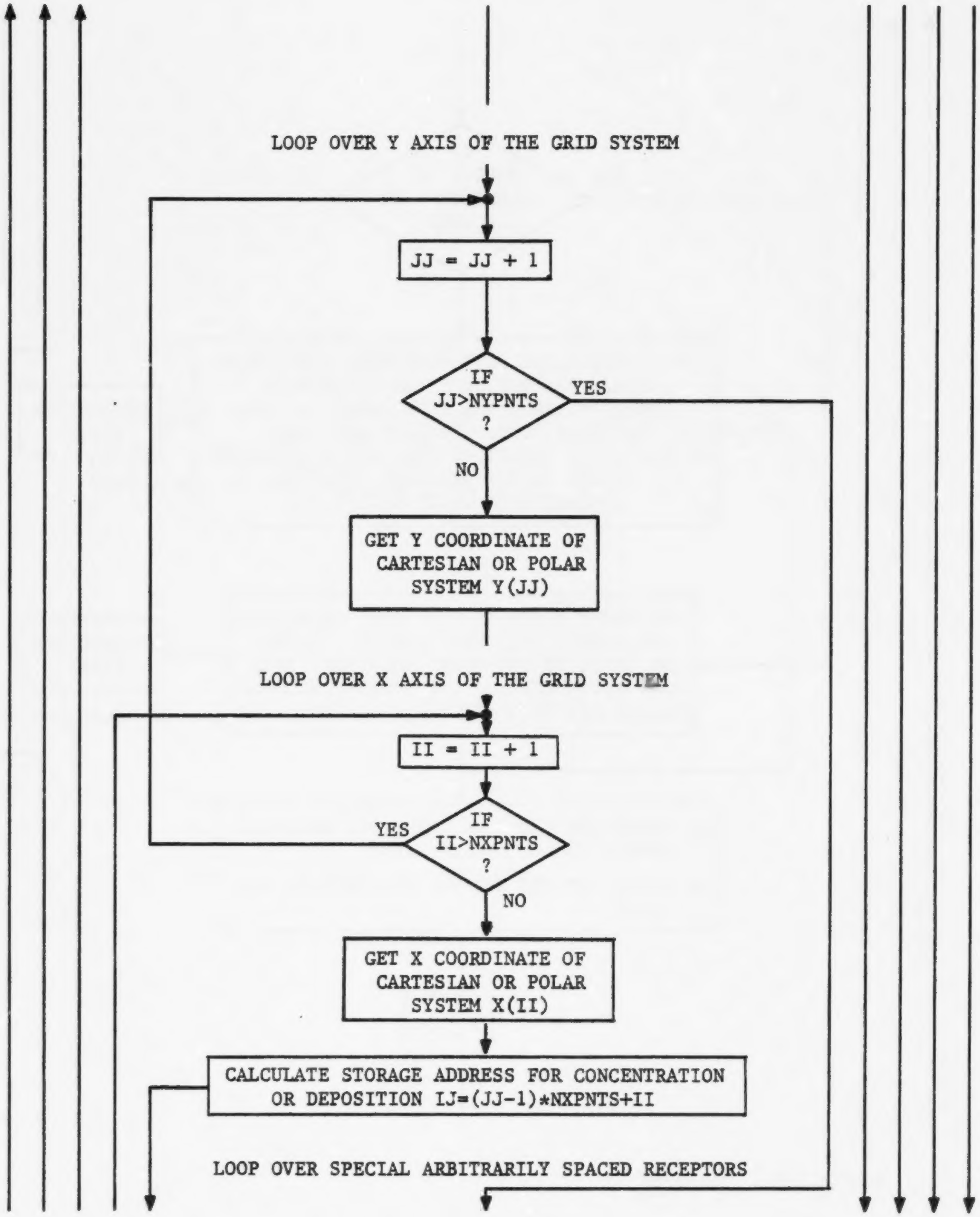

LOOP OVER Y AXIS OF THE GRID SYSTEM
JJ = JJ + 1
IF JJ>NYPNTS ?
YES
NO
GET Y COORDINATE OF CARTESIAN OR POLAR SYSTEM Y(JJ)
LOOP OVER X AXIS OF THE GRID SYSTEM
II = II + 1
IF II>NXPNTS ?
YES
NO
GET X COORDINATE OF CARTESIAN OR POLAR SYSTEM X(II)
CALCULATE STORAGE ADDRESS FOR CONCENTRATION OR DEPOSITION IJ=(JJ-1)*NXPNTS+II
LOOP OVER SPECIAL ARBITRARILY SPACED RECEPTORS

FIGURE I-2. (Continued)

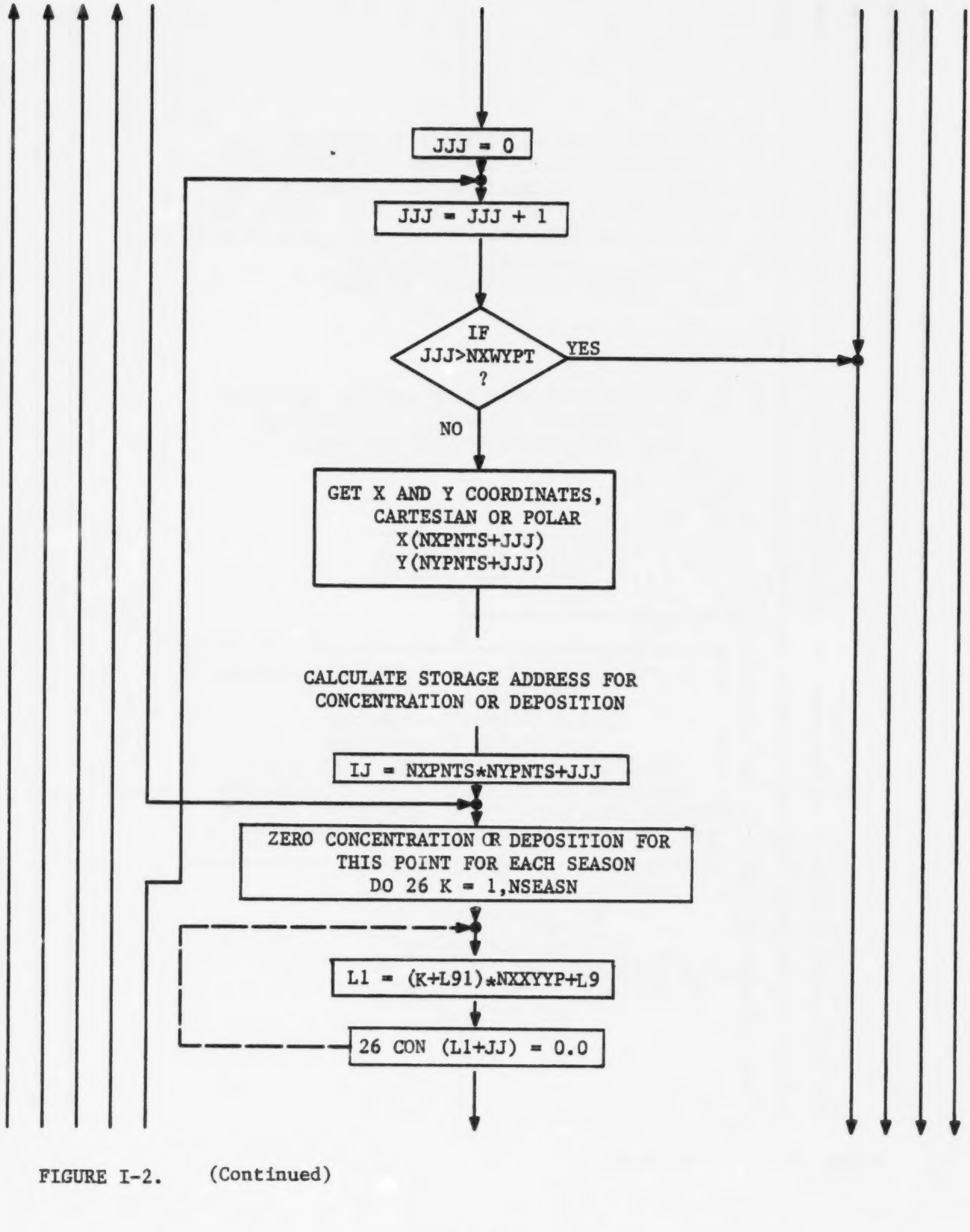
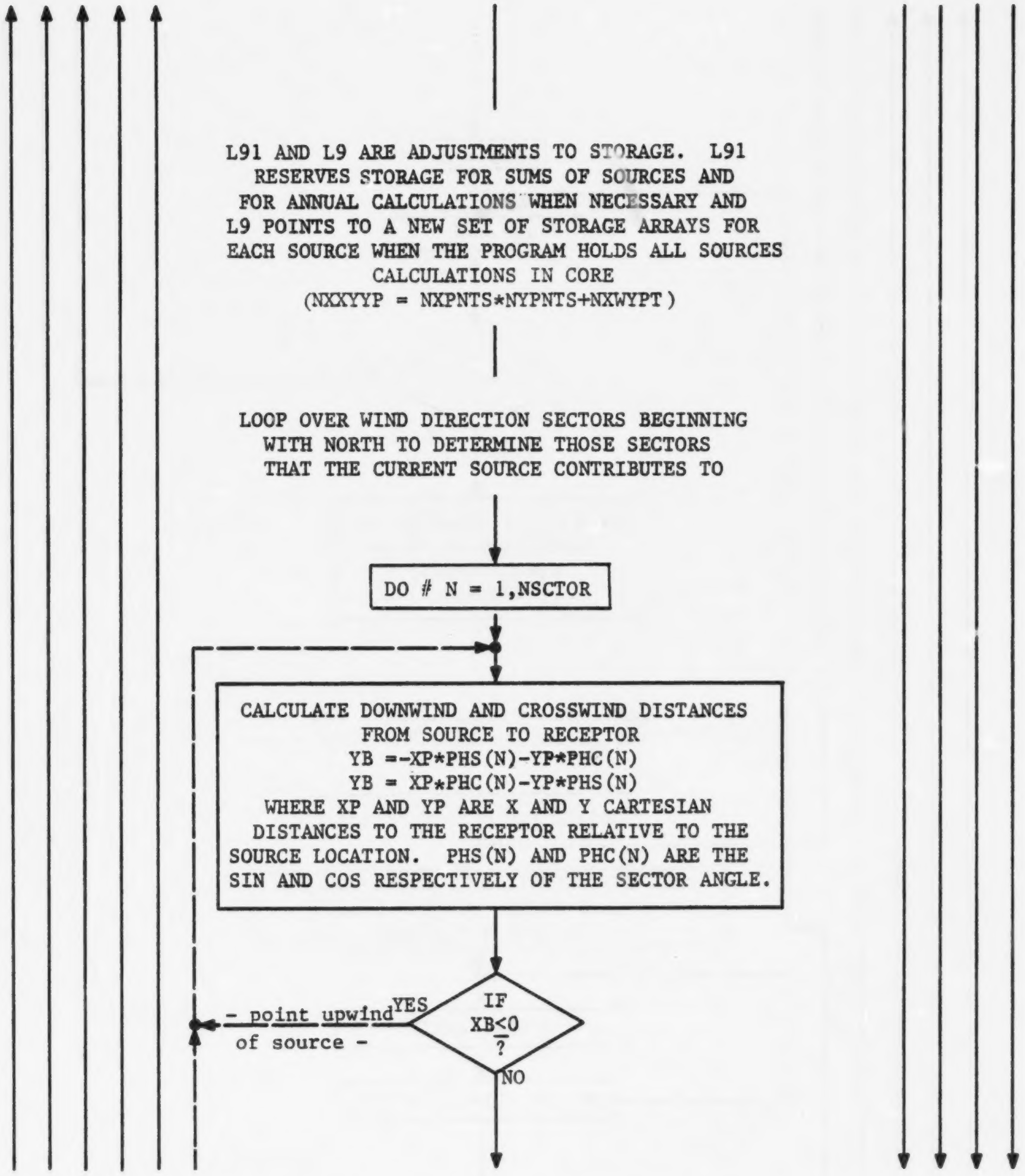

JJJ = 0
JJJ = JJJ + 1
IF JJJ>NXWYPT ?
YES
NO
GET X AND Y COORDINATES, CARTESIAN OR POLAR X(NXPNTS+JJJ) Y(NYPNTS+JJJ)
CALCULATE STORAGE ADDRESS FOR CONCENTRATION OR DEPOSITION
IJ = NXPNTS*NYPNTS+JJJ
ZERO CONCENTRATION OR DEPOSITION FOR THIS POINT FOR EACH SEASON DO 26 K = 1,NSEASN
L1 = (K+L91)*NXXYYP+L9
26 CON (L1+JJ) = 0.0

FIGURE I-2. (Continued)



L91 AND L9 ARE ADJUSTMENTS TO STORAGE. L91 RESERVES STORAGE FOR SUMS OF SOURCES AND FOR ANNUAL CALCULATIONS WHEN NECESSARY AND L9 POINTS TO A NEW SET OF STORAGE ARRAYS FOR EACH SOURCE WHEN THE PROGRAM HOLDS ALL SOURCES CALCULATIONS IN CORE
(NXXYYP = NXPNTS*NYPNTS+NXWYPT)

LOOP OVER WIND DIRECTION SECTORS BEGINNING WITH NORTH TO DETERMINE THOSE SECTORS THAT THE CURRENT SOURCE CONTRIBUTES TO

DO # N = 1,NSCTOR

CALCULATE DOWNWIND AND CROSSWIND DISTANCES FROM SOURCE TO RECEPTOR
YB =-XP*PHS(N)-YP*PHC(N)
YB = XP*PHC(N)-YP*PHS(N)
WHERE XP AND YP ARE X AND Y CARTESIAN DISTANCES TO THE RECEPTOR RELATIVE TO THE SOURCE LOCATION. PHS(N) AND PHC(N) ARE THE SIN AND COS RESPECTIVELY OF THE SECTOR ANGLE.

IF XB≤0 ?

FIGURE I-2. (Continued)

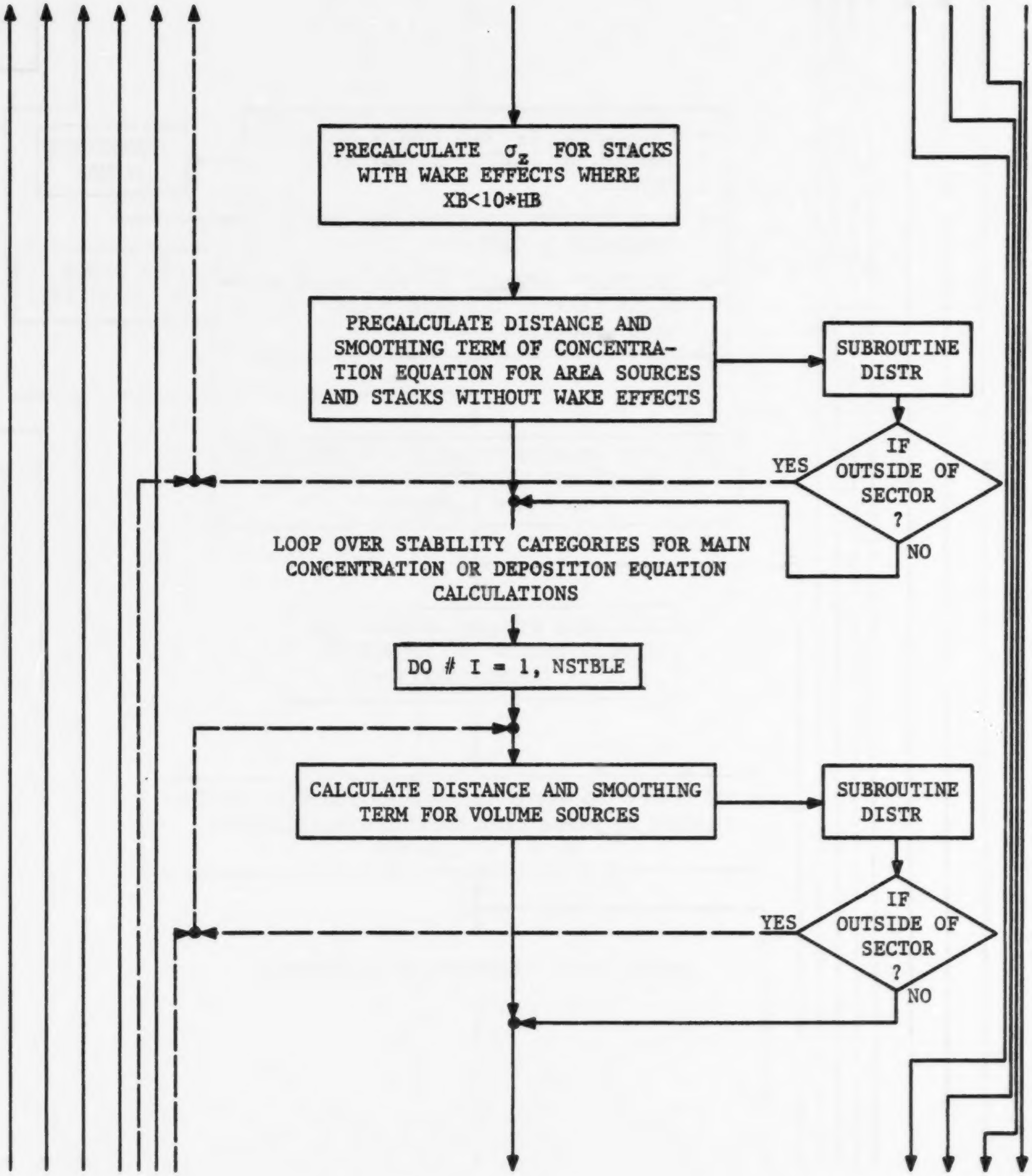

PRECALCULATE σ_z FOR STACKS WITH WAKE EFFECTS WHERE XB<10*HB
PRECALCULATE DISTANCE AND SMOOTHING TERM OF CONCENTRATION EQUATION FOR AREA SOURCES AND STACKS WITHOUT WAKE EFFECTS
SUBROUTINE DISTR
IF OUTSIDE OF SECTOR ?
YES
NO
LOOP OVER STABILITY CATEGORIES FOR MAIN CONCENTRATION OR DEPOSITION EQUATION CALCULATIONS
DO # I = 1, NSTBLE
CALCULATE DISTANCE AND SMOOTHING TERM FOR VOLUME SOURCES
SUBROUTINE DISTR
IF OUTSIDE OF SECTOR ?
YES
NO

FIGURE I-2. (Continued)

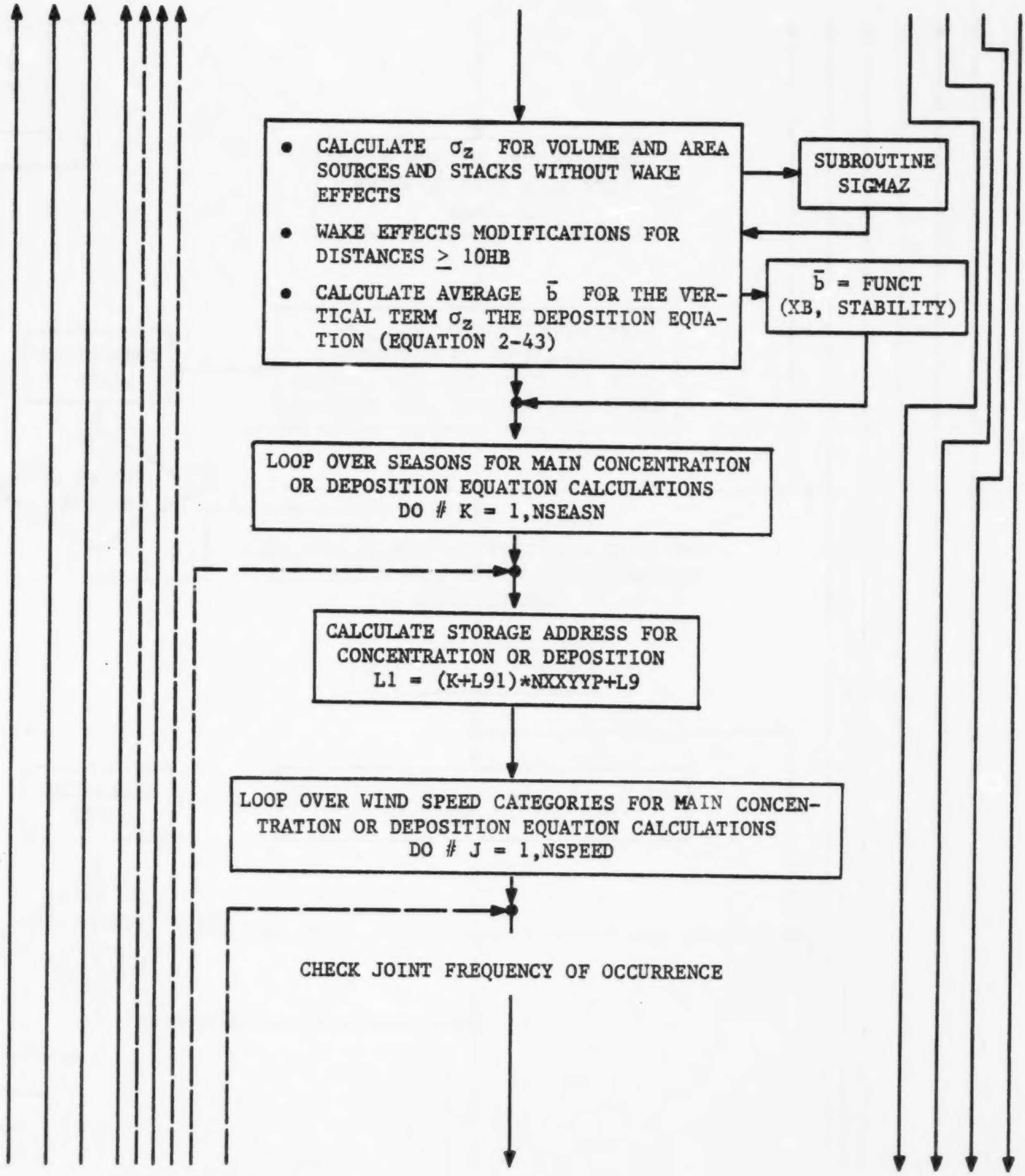

• CALCULATE σ_z FOR VOLUME AND AREA SOURCES AND STACKS WITHOUT WAKE EFFECTS
• WAKE EFFECTS MODIFICATIONS FOR DISTANCES $\geq$ 10HB
• CALCULATE AVERAGE $\bar{b}$ FOR THE VERTICAL TERM σ_z THE DEPOSITION EQUATION (EQUATION 2-43)
SUBROUTINE SIGMAZ
$\bar{b}$ = FUNCT (XB, STABILITY)
LOOP OVER SEASONS FOR MAIN CONCENTRATION OR DEPOSITION EQUATION CALCULATIONS
DO # K = 1,NSEASN
CALCULATE STORAGE ADDRESS FOR CONCENTRATION OR DEPOSITION
L1 = (K+L91)*NXXYYP+L9
LOOP OVER WIND SPEED CATEGORIES FOR MAIN CONCENTRATION OR DEPOSITION EQUATION CALCULATIONS
DO # J = 1,NSPEED
CHECK JOINT FREQUENCY OF OCCURRENCE

FIGURE I-2. (Continued)

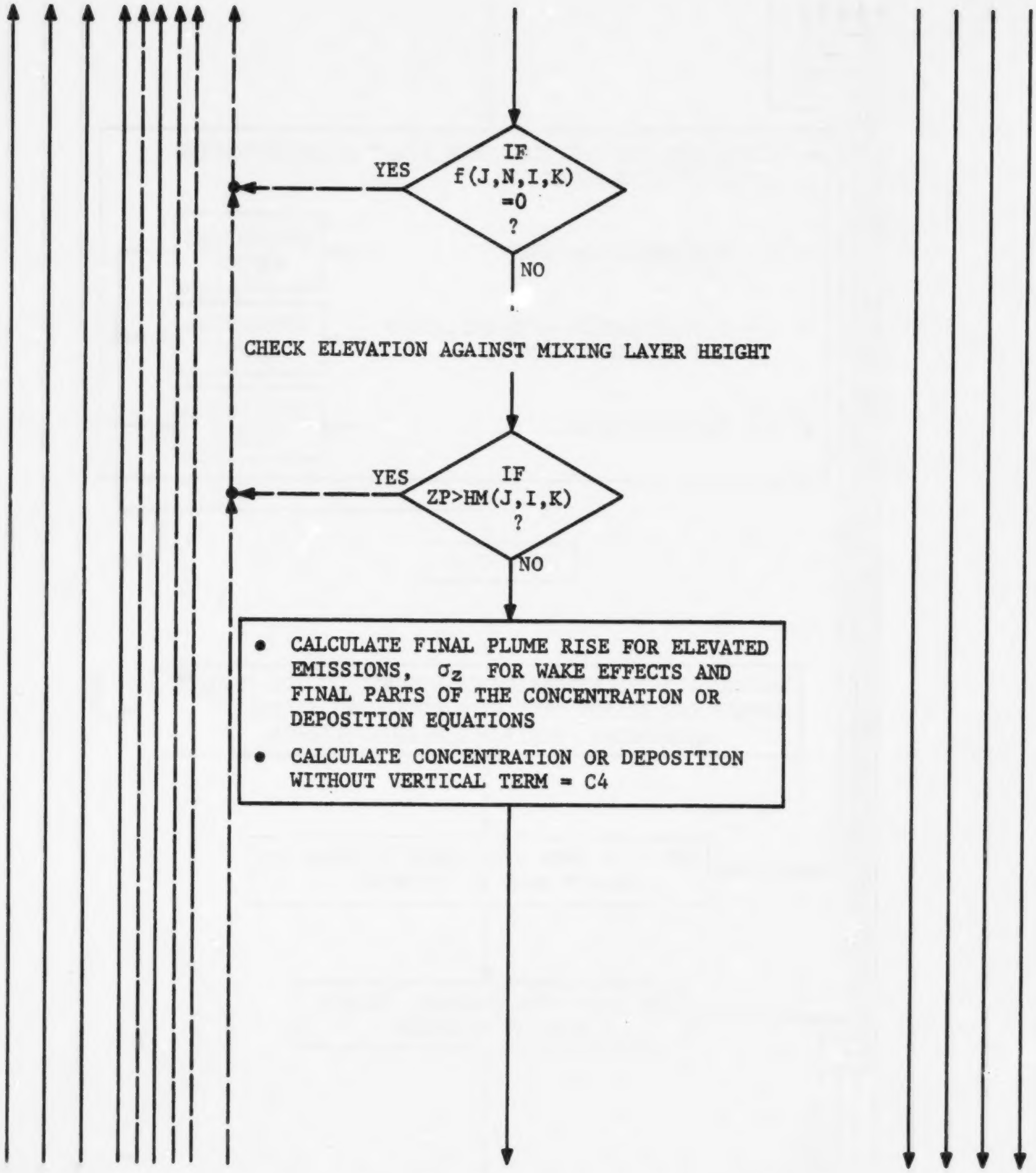

IF
f(J,N,I,K)
=0
?
YES
NO
CHECK ELEVATION AGAINST MIXING LAYER HEIGHT
IF
ZP>HM(J,I,K)
?
YES
NO
• CALCULATE FINAL PLUME RISE FOR ELEVATED EMISSIONS, σ_z FOR WAKE EFFECTS AND FINAL PARTS OF THE CONCENTRATION OR DEPOSITION EQUATIONS
• CALCULATE CONCENTRATION OR DEPOSITION WITHOUT VERTICAL TERM = C4

FIGURE I-2. (Continued)

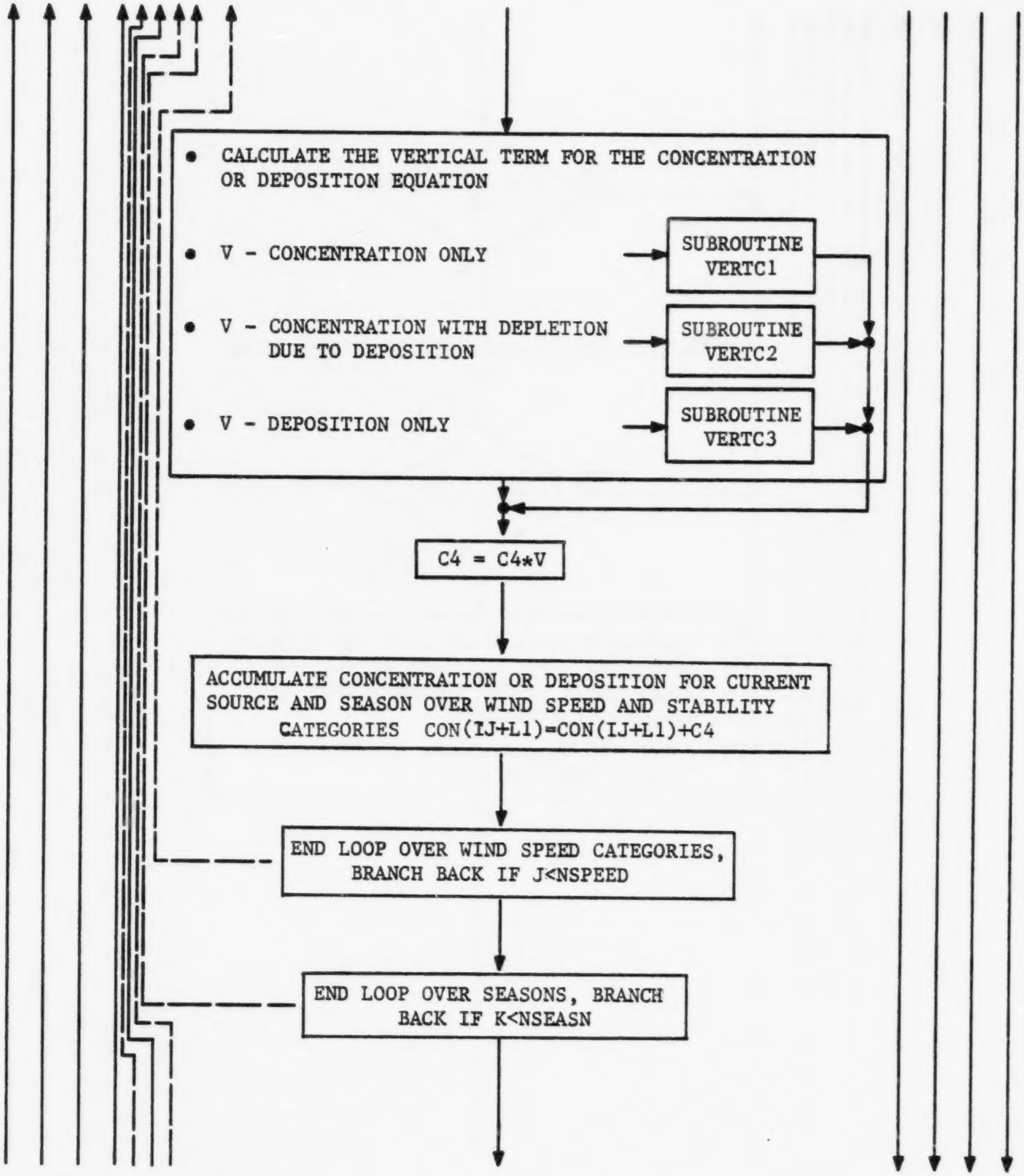

• CALCULATE THE VERTICAL TERM FOR THE CONCENTRATION OR DEPOSITION EQUATION
• V - CONCENTRATION ONLY
SUBROUTINE VERTC1
• V - CONCENTRATION WITH DEPLETION DUE TO DEPOSITION
SUBROUTINE VERTC2
• V - DEPOSITION ONLY
SUBROUTINE VERTC3
C4 = C4*V
ACCUMULATE CONCENTRATION OR DEPOSITION FOR CURRENT SOURCE AND SEASON OVER WIND SPEED AND STABILITY CATEGORIES CON(IJ+L1)=CON(IJ+L1)+C4
END LOOP OVER WIND SPEED CATEGORIES, BRANCH BACK IF J<NSPEED
END LOOP OVER SEASONS, BRANCH BACK IF K<NSEASN

FIGURE I-2. (Continued)

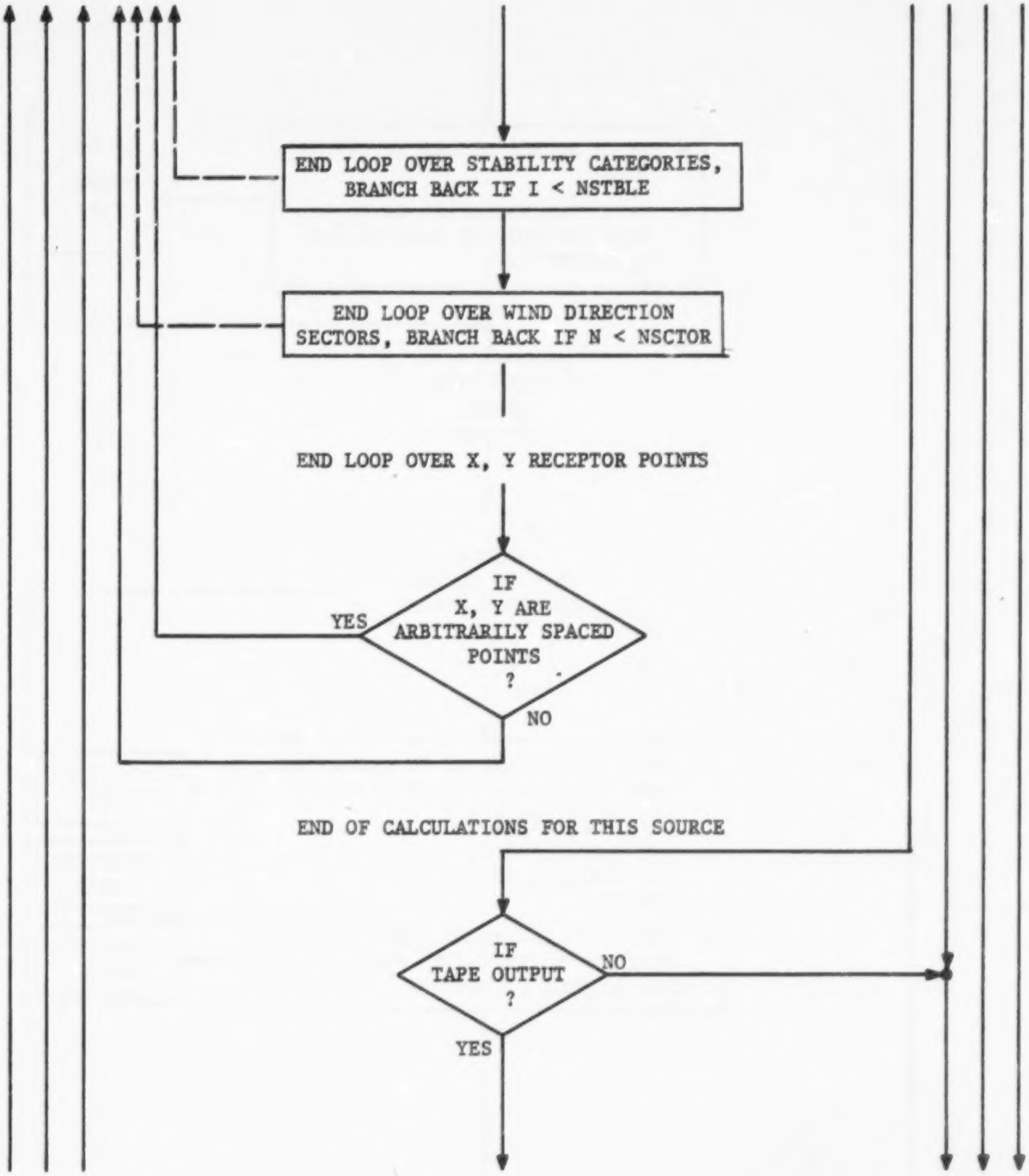

END LOOP OVER STABILITY CATEGORIES, BRANCH BACK IF I < NSTBLE
END LOOP OVER WIND DIRECTION SECTORS, BRANCH BACK IF N < NSCTOR
END LOOP OVER X, Y RECEPTOR POINTS
IF X, Y ARE ARBITRARILY SPACED POINTS ?
YES
NO
END OF CALCULATIONS FOR THIS SOURCE
IF TAPE OUTPUT ?
NO
YES

FIGURE I-2. (Continued)

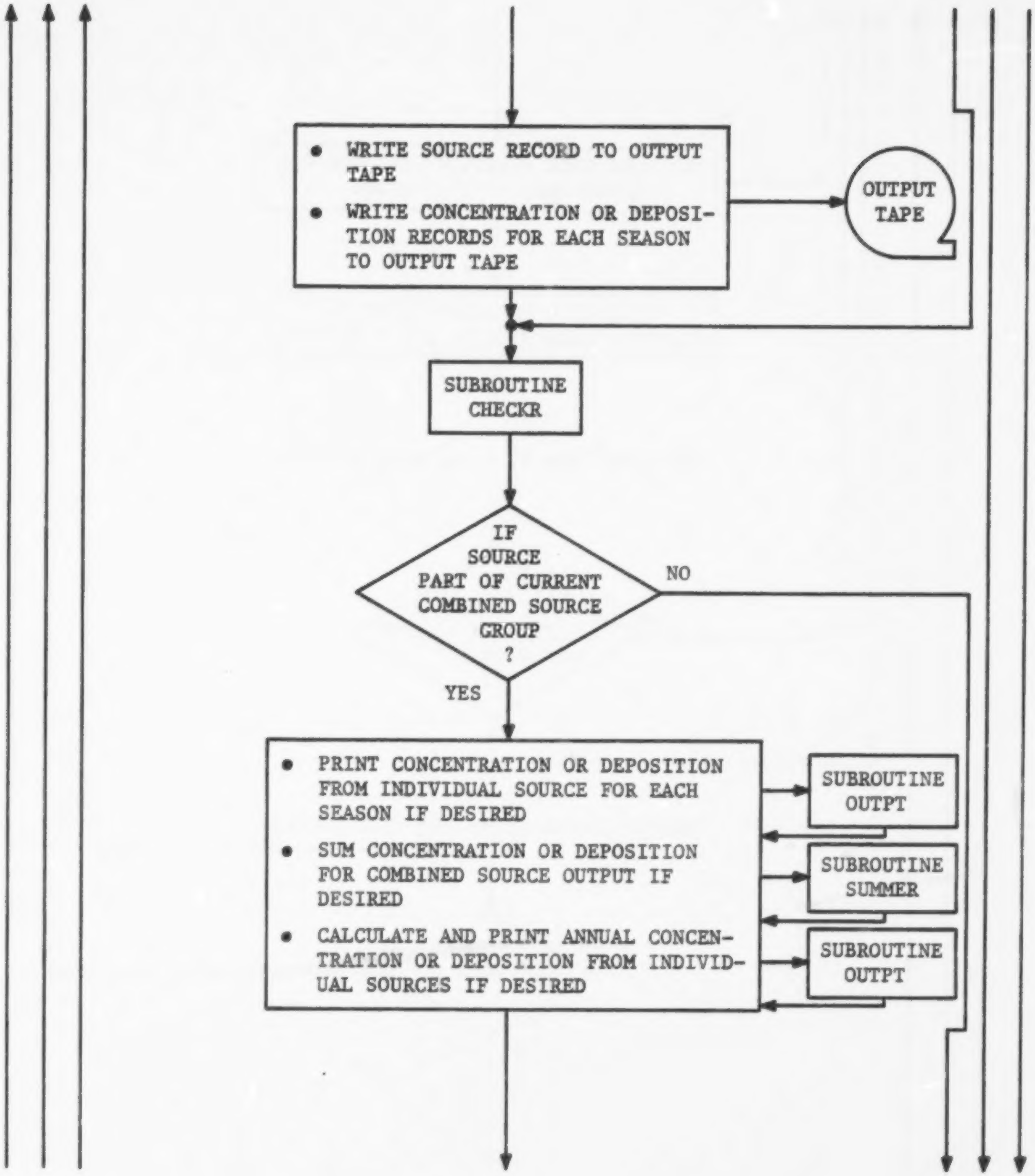

WRITE SOURCE RECORD TO OUTPUT TAPE
WRITE CONCENTRATION OR DEPOSITION RECORDS FOR EACH SEASON TO OUTPUT TAPE
OUTPUT TAPE
SUBROUTINE CHECKR
IF SOURCE PART OF CURRENT COMBINED SOURCE GROUP ?
NO
YES
PRINT CONCENTRATION OR DEPOSITION FROM INDIVIDUAL SOURCE FOR EACH SEASON IF DESIRED
SUM CONCENTRATION OR DEPOSITION FOR COMBINED SOURCE OUTPUT IF DESIRED
CALCULATE AND PRINT ANNUAL CONCENTRATION OR DEPOSITION FROM INDIVIDUAL SOURCES IF DESIRED
SUBROUTINE OUTPT
SUBROUTINE SUMMER
SUBROUTINE OUTPT

FIGURE I-2. (Continued)

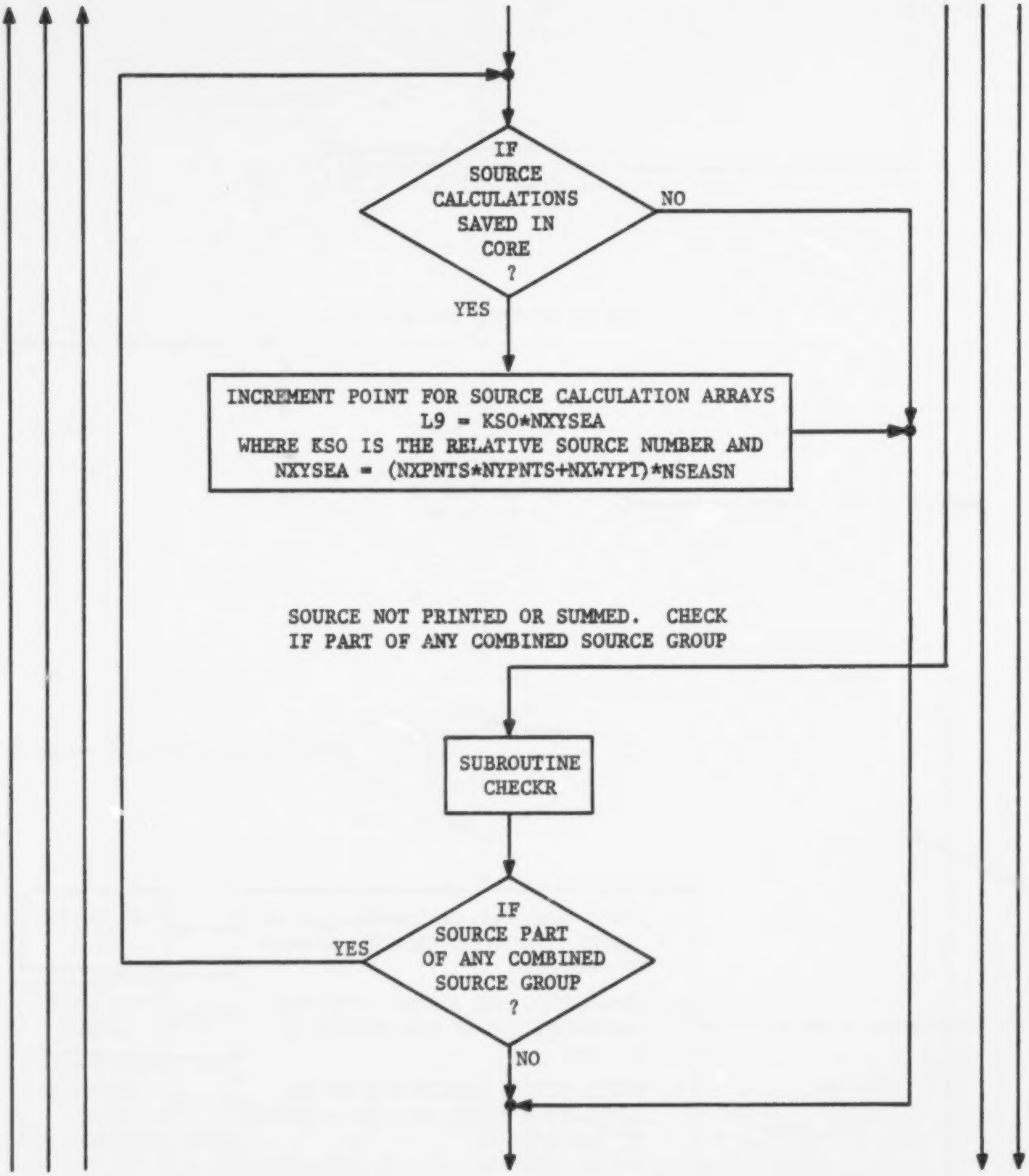

IF SOURCE CALCULATIONS SAVED IN CORE ?
NO
YES
INCREMENT POINT FOR SOURCE CALCULATION ARRAYS
L9 = KSO*NXYSEA
WHERE KSO IS THE RELATIVE SOURCE NUMBER AND
NXYSEA = (NXPNTS*NYPNTS+NXWYPT)*NSEASN
SOURCE NOT PRINTED OR SUMMED. CHECK
IF PART OF ANY COMBINED SOURCE GROUP
SUBROUTINE CHECKR
IF SOURCE PART OF ANY COMBINED SOURCE GROUP ?
YES
NO

FIGURE I-2. (Continued)

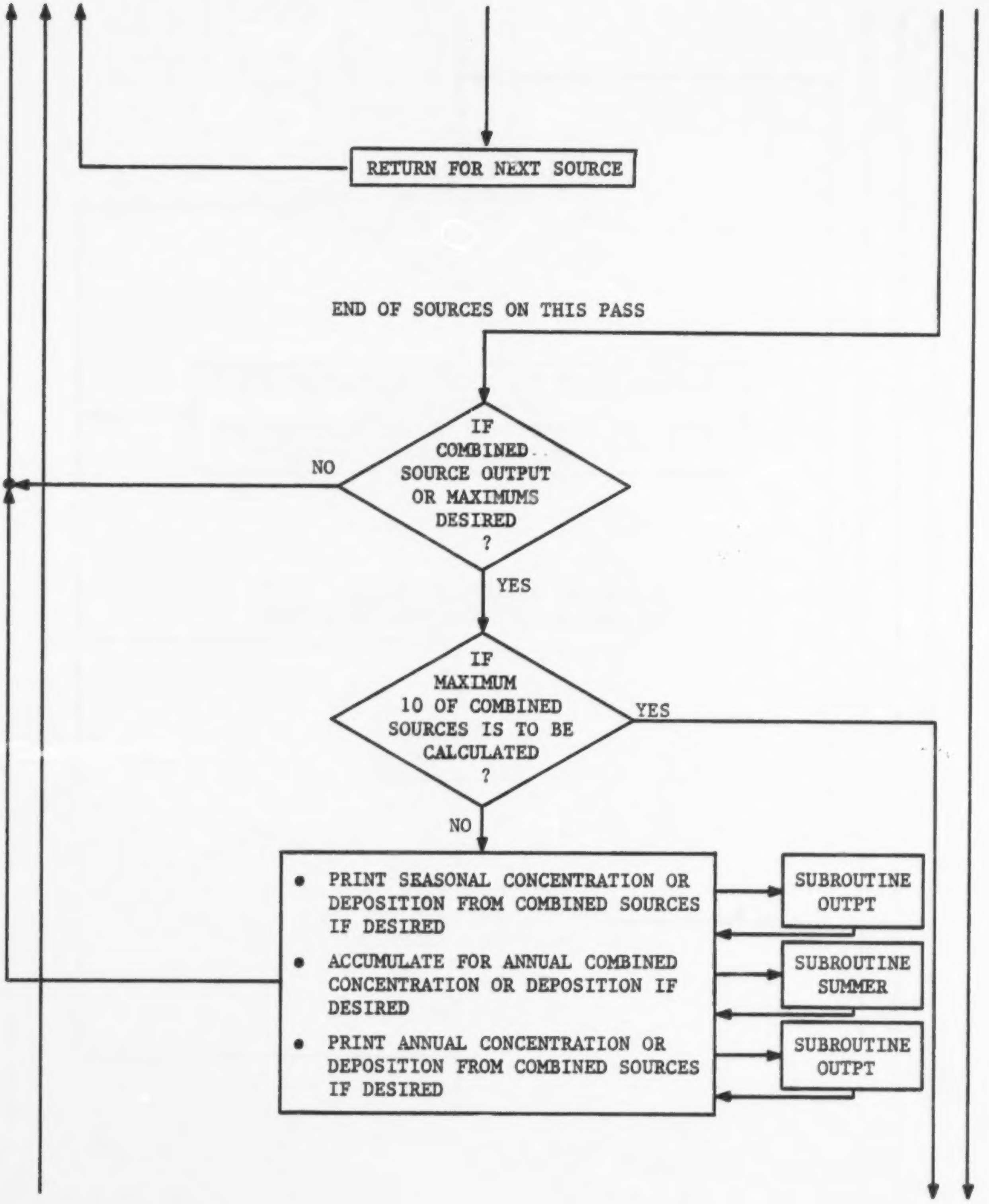

RETURN FOR NEXT SOURCE
END OF SOURCES ON THIS PASS
IF COMBINED SOURCE OUTPUT OR MAXIMUMS DESIRED ?
NO
YES
IF MAXIMUM 10 OF COMBINED SOURCES IS TO BE CALCULATED ?
YES
NO
• PRINT SEASONAL CONCENTRATION OR DEPOSITION FROM COMBINED SOURCES IF DESIRED
• ACCUMULATE FOR ANNUAL COMBINED CONCENTRATION OR DEPOSITION IF DESIRED
• PRINT ANNUAL CONCENTRATION OR DEPOSITION FROM COMBINED SOURCES IF DESIRED
SUBROUTINE OUTPT
SUBROUTINE SUMMER
SUBROUTINE OUTPT

FIGURE I-2. (Continued)

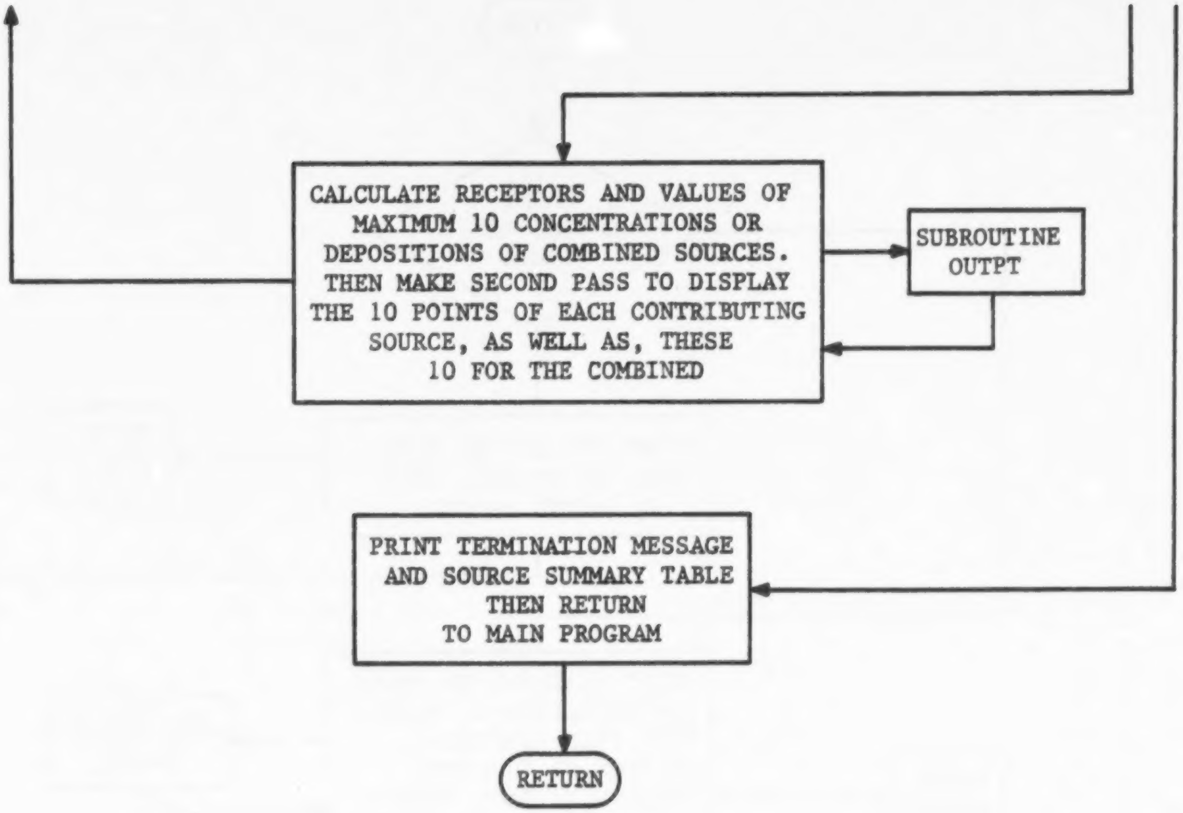

CALCULATE RECEPTORS AND VALUES OF MAXIMUM 10 CONCENTRATIONS OR DEPOSITIONS OF COMBINED SOURCES. THEN MAKE SECOND PASS TO DISPLAY THE 10 POINTS OF EACH CONTRIBUTING SOURCE, AS WELL AS, THESE 10 FOR THE COMBINED
SUBROUTINE OUTPT
PRINT TERMINATION MESSAGE AND SOURCE SUMMARY TABLE THEN RETURN TO MAIN PROGRAM
RETURN

FIGURE I-2. (Continued)

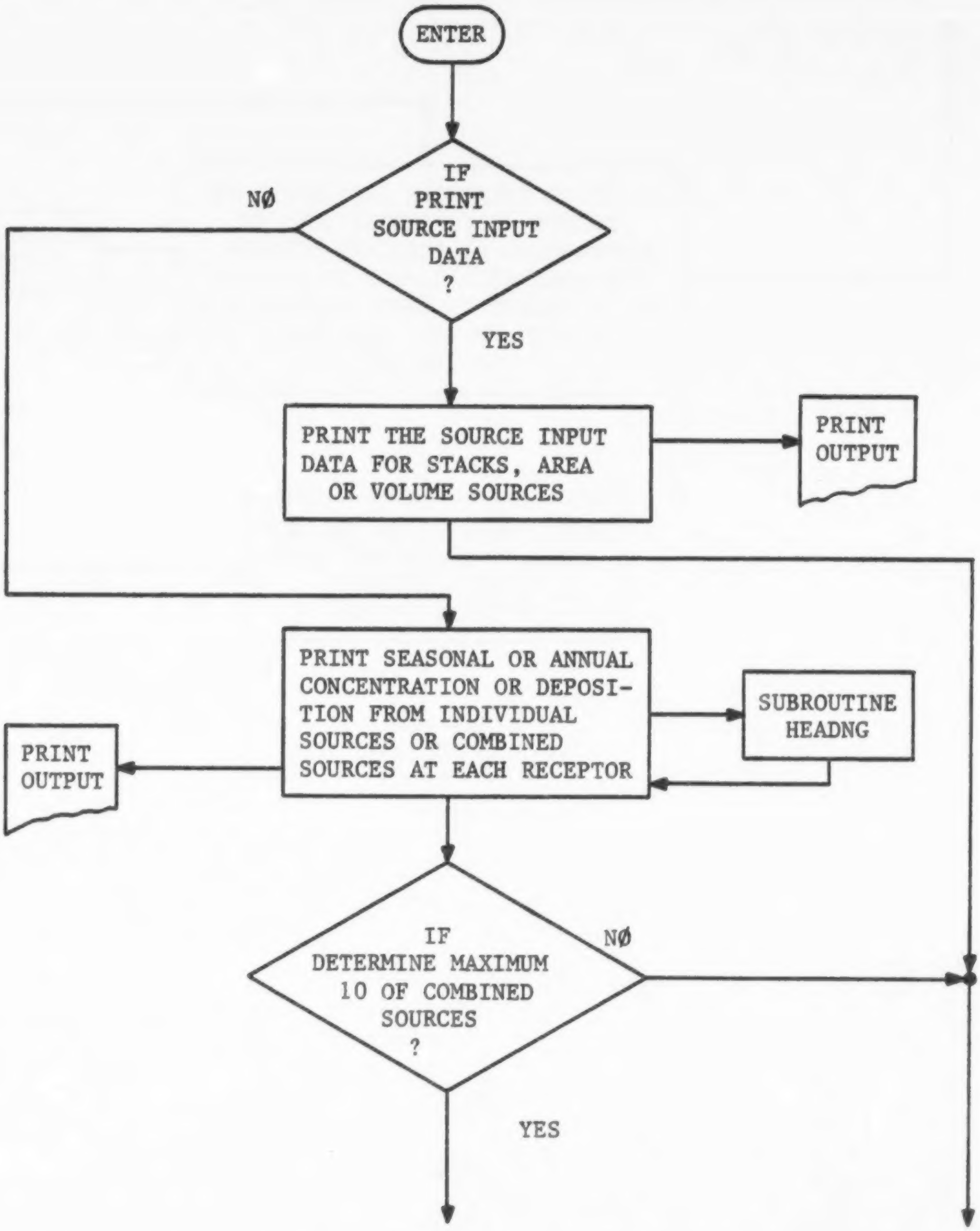

ENTER
IF PRINT SOURCE INPUT DATA ?
NØ
YES
PRINT THE SOURCE INPUT DATA FOR STACKS, AREA OR VOLUME SOURCES
PRINT OUTPUT
PRINT SEASONAL OR ANNUAL CONCENTRATION OR DEPOSITION FROM INDIVIDUAL SOURCES OR COMBINED SOURCES AT EACH RECEPTOR
SUBROUTINE HEADNG
PRINT OUTPUT
IF DETERMINE MAXIMUM 10 OF COMBINED SOURCES ?
NØ
YES

FIGURE I-3. OUTPT Logic Flow Diagram -- SUBROUTINE OUTPT. Subroutine OUTPT performs and controls the printed output of source data, the concentration or deposition of individual sources and combined sources and calculates the 10 receptors where the maximums occur.

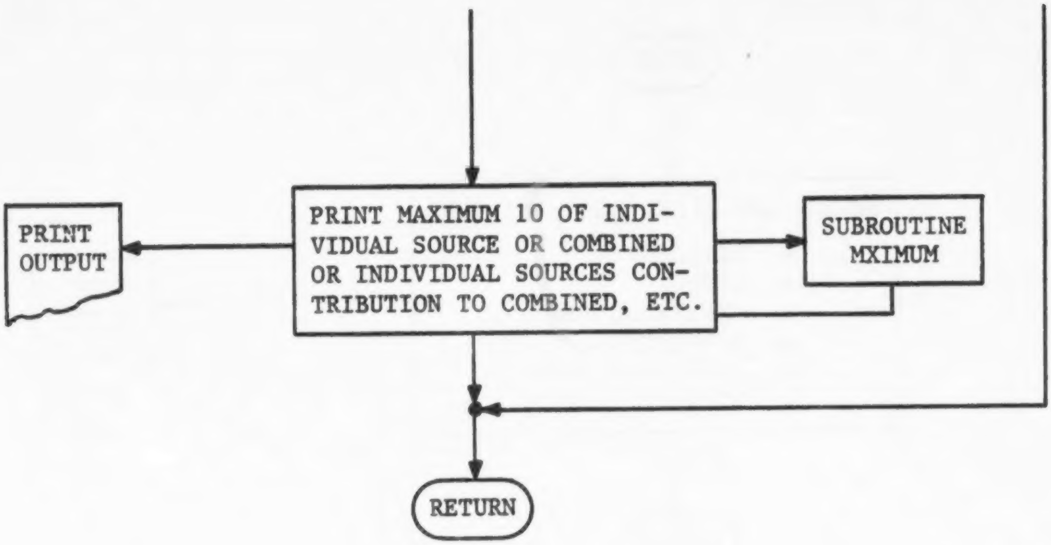

PRINT OUTPUT
PRINT MAXIMUM 10 OF INDIVIDUAL SOURCE OR COMBINED OR INDIVIDUAL SOURCES CONTRIBUTION TO COMBINED, ETC.
SUBROUTINE MXIMUM
RETURN

FIGURE I-3. (Continued)

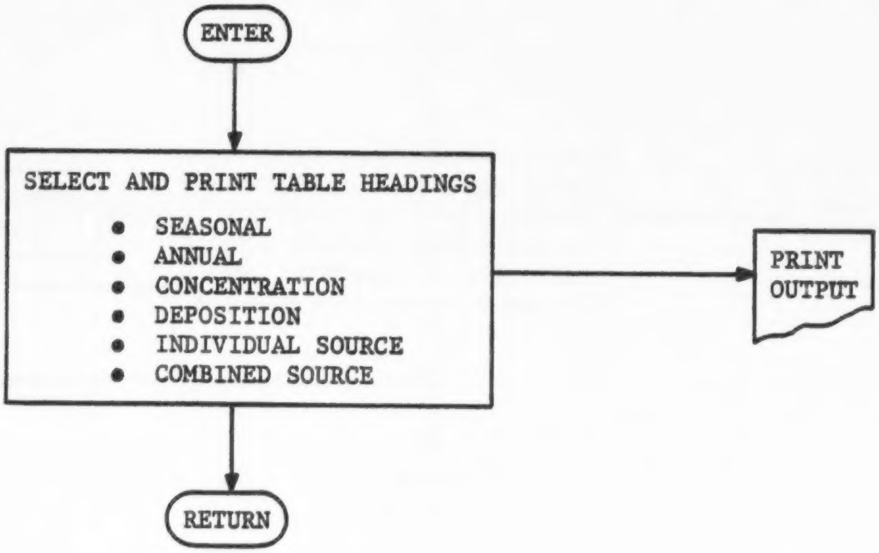

ENTER
SELECT AND PRINT TABLE HEADINGS
• SEASONAL
• ANNUAL
• CONCENTRATION
• DEPOSITION
• INDIVIDUAL SOURCE
• COMBINED SOURCE
PRINT OUTPUT
RETURN

FIGURE I-4. HEADNG Logic Flow Diagram -- SUBROUTINE HEADNG. Subroutine HEADNG prints the headings for each type of output.

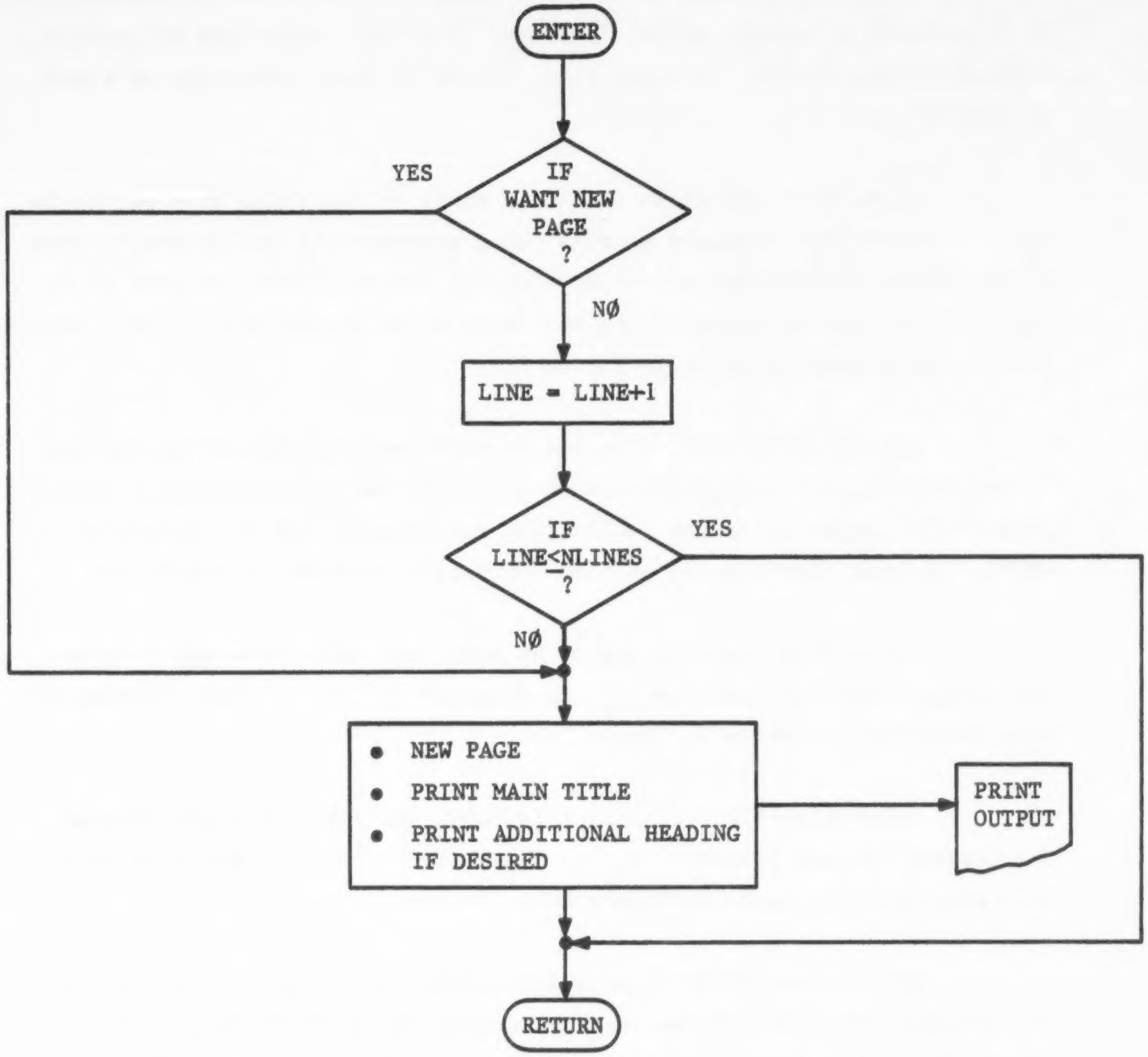

ENTER
IF WANT NEW PAGE ?
YES
NO
LINE = LINE+1
IF LINE≤NLINES ?
YES
NO
• NEW PAGE
• PRINT MAIN TITLE
• PRINT ADDITIONAL HEADING IF DESIRED
PRINT OUTPUT
RETURN

FIGURE I-5. TITLR Logic Flow Diagram -- SUBROUTINE TITLR. Subroutine TITLR increments the line counter for proper positioning of the page heading, counts the pages and writes select headings to the input data table, input source table, etc.

Subroutine SUMMER is called by MODEL to sum arrays of concentration or deposition to provide annual (averaged or total) output and to provide combined source output. A logic flow diagram of this subroutine is shown in Figure I-6.

Subroutine CHECKR is called by MODEL to determine if a source is part of the current combined sources being summed or if the source is part of any source combination so the program can decide whether to save it or not when all sources calculations are being saved in storage. A flow diagram of this subroutine is shown in Figure I-7

Subroutine MXIMUM is called by OUTPT and determines the maximum 10 concentration or deposition values and their respective receptor coordinates for a source or source combination and returns them to subroutine OUTPT. A logic flow diagram of this subroutine is shown in Figure I-8.

Subroutine VIRTZ is called by MODEL and calculates and returns the vertical virtual distance x_z in Equation (2-23). A logic diagram of this subroutine is shown in Figure I-9.

Subroutine VIRTY is called by MODEL and calculates and returns the lateral virtual distance x_y in Equation (2-22). A logic diagram of this subroutine is shown in Figure I-10.

Subroutine SIGMAZ is called by MODEL and calculates and returns the standard deviation of the vertical concentration distribution σ_z (Table 2-8) at a respective downwind distance and for a respective stability category. A logic flow diagram of this subroutine is shown in Figure I-11.

Subroutine VERTC1 is called by MODEL and calculates and returns the Vertical Term (Equations (2-49) and (2-50)) of the concentration equation. A logic flow diagram of the subroutine is shown in Figure I-12.

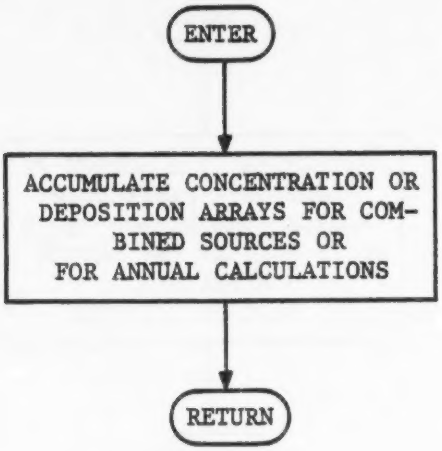

ENTER
ACCUMULATE CONCENTRATION OR DEPOSITION ARRAYS FOR COMBINED SOURCES OR FOR ANNUAL CALCULATIONS
RETURN

FIGURE I-6. SUMMER Logic Flow Diagram -- SUBROUTINE SUMMER.

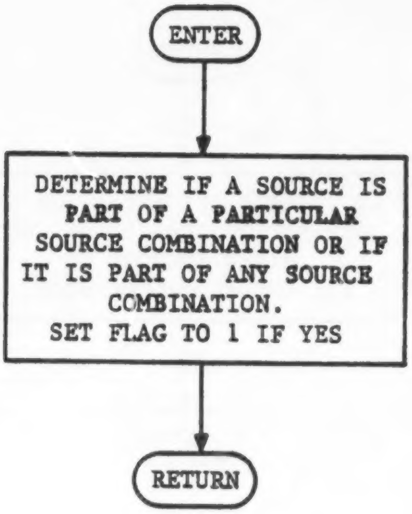

ENTER
DETERMINE IF A SOURCE IS PART OF A PARTICULAR SOURCE COMBINATION OR IF IT IS PART OF ANY SOURCE COMBINATION.
SET FLAG TO 1 IF YES
RETURN

FIGURE I-7. CHECKR Logic Flow Diagram -- SUBROUTINE CHECKR.

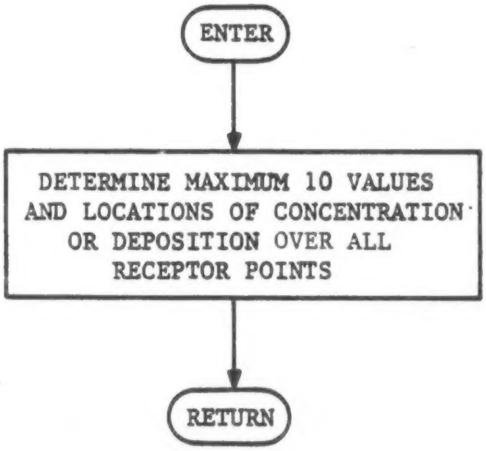

ENTER
DETERMINE MAXIMUM 10 VALUES AND LOCATIONS OF CONCENTRATION OR DEPOSITION OVER ALL RECEPTOR POINTS
RETURN

FIGURE I-8. MXIMUM Logic Flow Diagram -- SUBROUTINE MXIMUM.

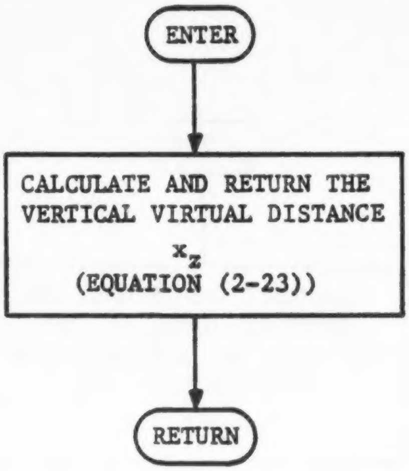

ENTER
CALCULATE AND RETURN THE VERTICAL VIRTUAL DISTANCE x_z (EQUATION (2-23))
RETURN

FIGURE I-9. VIRTZ Logic Flow Diagram -- FUNCTION VIRTZ.

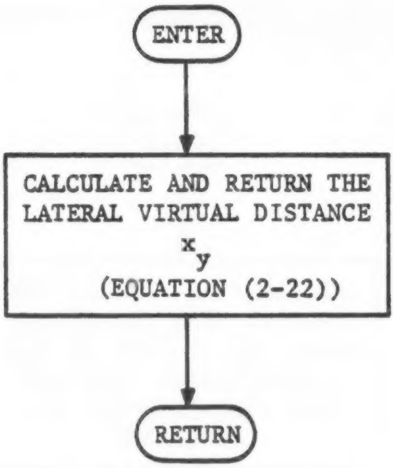

ENTER
CALCULATE AND RETURN THE LATERAL VIRTUAL DISTANCE x_y (EQUATION (2-22))
RETURN

FIGURE I-10. VIRTY Logic Flow Diagram -- FUNCTION VIRTY.

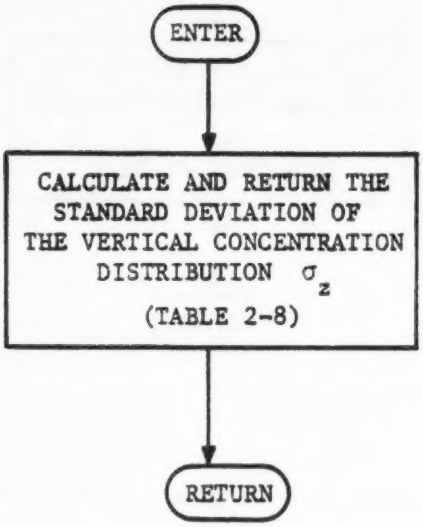

ENTER
CALCULATE AND RETURN THE STANDARD DEVIATION OF THE VERTICAL CONCENTRATION DISTRIBUTION σ_z (TABLE 2-8)
RETURN

FIGURE I-11. SIGMAZ Logic Flow Diagram -- FUNCTION SIGMAZ.

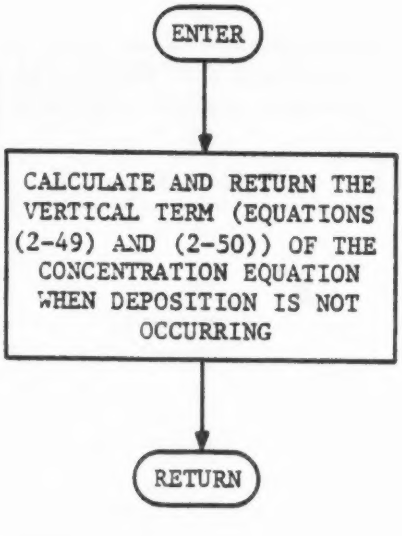

ENTER
CALCULATE AND RETURN THE VERTICAL TERM (EQUATIONS (2-49) AND (2-50)) OF THE CONCENTRATION EQUATION WHEN DEPOSITION IS NOT OCCURRING
RETURN

FIGURE I-12. VERTC1 Logic Flow Diagram -- SUBROUTINE VERTC1.

Subroutine VERTC2 is called by MODEL and calculates and returns the Vertical Term of Equation (2-51) for each particulate size category in the calculation of concentration with deposition occurring. A logic flow diagram of this routine is shown in Figure I-13.

Subroutine VERTC3 is called by MODEL and calculates and returns the vertical term of Equation (2-54) for each particulate size category used in the deposition equation. A logic flow diagram of this subroutine is shown in Figure I-14.

Function FUNCT is called by MODEL and calculates and returns the average value $\bar{b}$ of the coefficient b which is the exponent used in the σ_z equation. This value is used in the deposition calculations see Equation (2-54)) and is shown in Table 2-8. A logic flow diagram of this routine is shown in Figure I-15.

Subroutine DISTR is called by MODEL and calculates and returns the distance between the source and receptor if the receptor is within the required calculation sector and calculates the smoothing term of the concentration or deposition equation $S\{\theta\}$ (Equation (2-52)). Subroutine DISTR returns $\frac{S\{\theta\}}{r\Delta\theta'}$ from Equation (2-45) or returns a "-1" if the receptor point is outside of the calculation sector downwind of the source. A logic flow diagram of this subroutine is shown in Figure I-16.

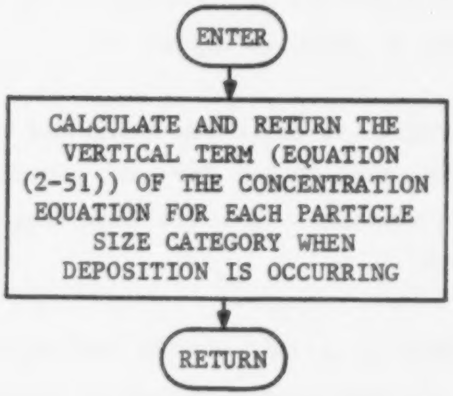

ENTER
CALCULATE AND RETURN THE VERTICAL TERM (EQUATION (2-51)) OF THE CONCENTRATION EQUATION FOR EACH PARTICLE SIZE CATEGORY WHEN DEPOSITION IS OCCURRING
RETURN

FIGURE I-13. VERTC2 Logic Flow Diagram -- SUBROUTINE VERTC2.

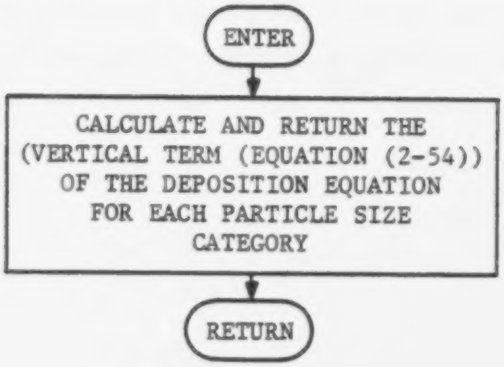
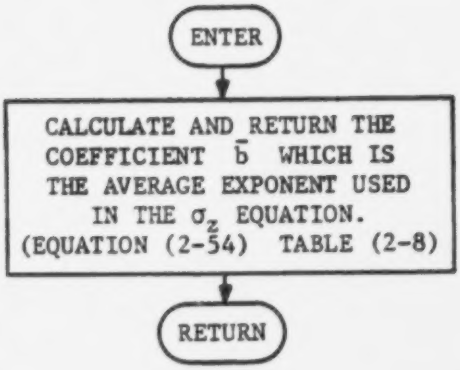
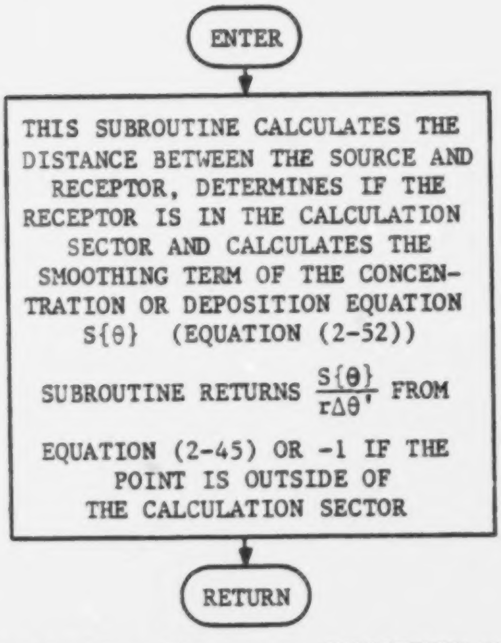

ENTER
CALCULATE AND RETURN THE (VERTICAL TERM (EQUATION (2-54)) OF THE DEPOSITION EQUATION FOR EACH PARTICLE SIZE CATEGORY
RETURN

FIGURE I-14. VERTC3 Logic Flow Diagram -- SUBROUTINE VERTC3.



CALCULATE AND RETURN THE COEFFICIENT $\bar{b}$ WHICH IS THE AVERAGE EXPONENT USED IN THE σ_z EQUATION. (EQUATION (2-54) TABLE (2-8)

FIGURE I-15. FUNCT Logic Flow Diagram -- FUNCTION FUNCT.



THIS SUBROUTINE CALCULATES THE DISTANCE BETWEEN THE SOURCE AND RECEPTOR, DETERMINES IF THE RECEPTOR IS IN THE CALCULATION SECTOR AND CALCULATES THE SMOOTHING TERM OF THE CONCENTRATION OR DEPOSITION EQUATION $S\{\theta\}$ (EQUATION (2-52))

SUBROUTINE RETURNS $\frac{S\{\theta\}}{r\Delta\theta'}$ FROM EQUATION (2-45) OR -1 IF THE POINT IS OUTSIDE OF THE CALCULATION SECTOR

FIGURE I-16. DISTR Logic Flow Diagram -- SUBROUTINE DISTR.